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Battling the (Algae) Bloom: Watershed Policies and Plans in Wisconsin

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BATTLING THE (ALGAE) BLOOM: WATERSHED POLICIES AND PLANS IN WISCONSIN

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Abstract: Algae blooms and unsafe nitrate levels caused primarily by nutrients in runoff from agricultural and urban areas plague waterbodies across the United States. The nutrient pollution problem can be effectively addressed through the development and implementation of appropriately scaled watershed plans. To encourage needed planning and implementation, the Environmental Protection Agency and states must utilize an improved watershed policy approach. For decades, such an approach has been stymied by a nebulous watershed concept and legal, political, and financial obstacles. This article provides an in-depth look at policies that provide the foundation and framework for watershed planning and implementation in Wisconsin, makes concrete recommendations for Total Maximum Daily Load, urban stormwater and agricultural runoff programs, and discusses model watershed plans and case studies. Through improved policies that catalyze appropriately scaled watershed planning and implementation, it may be possible to avoid costly litigation and ineffective regulatory or large-scale TMDL approaches.

INTRODUCTION

For the first twenty-five years after its passage, Clean Water Act (CWA) implementation focused on technology-based standards for Publicly Owned Treatment Works ("POTWs") and industrial facilities.[1] Although the CWA also

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[1] *See* Clean Water Act of 1977, Pub. L. 95-217, 91 Stat. 1566 (codified as amended in scattered sections of 33 U.S.C.); *see, e.g.,* Memorandum from Robert Perciasepe, Assistant Adm'r, Envtl. Prot. Agency, to Reg'l Adm'rs & Reg'l Water Div. Dirs., New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs) (Oct. 21, 2003), https://www.epa.gov/sites/production/files/2015-10/documents/2003_10_21_tmdl_ratepace1997guid_0.pdf [https://perma.cc/7N85-4ST2]. Technology-based effluent limitations are wastewater discharge standards that the Environmental Protection Agency (EPA) develops for different categories of industrial sources of wastewater. 33 U.S.C. § 1311 (2012). The Environmental Protection Agency (EPA) identifies appropriate pollutant removal technology for each industry category and requires relevant industrial sources to meet a level of pollutant removal equivalent to the performance of the technology identified by EPA. *See National*

requires the use of ambient water quality-based standards and a watershed planning approach where water quality challenges persist, for more than two decades, states and the United States Environmental Protection Agency (EPA) largely failed to use those provisions to improve water quality.[2] This started to change in the 1990s when EPA, pushed by citizen lawsuits, shifted its focus and increased agency emphasis on a watershed approach.[3]

Despite nearly thirty years of promoting and working with the watershed approach, the watershed concept itself remains unclear, as do the requirements for water quality-based effluent limits, watershed planning through the Total Maximum Daily Load ("TMDL") program and other related statutory and regulatory provisions.[4] This enduring confusion, combined with regulatory, financial, and political obstacles at both the state and federal levels, have stymied implementation of the approach. In part as a result of these challenges, nutrient pollution, which is more effectively addressed through watershed approaches,

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Pollutant Discharge Elimination System (NPDES): Secondary Treatment Standards, U.S. ENVTL. PROT. AGENCY (Nov. 1, 2016), https://www.epa.gov/npdes/secondary-treatment-standards [https://perma.cc/C8HT-76QS] ("EPA establishes secondary treatment standards for publicly owned treatment works ("POTWs"), which are minimum, technology-based requirements for municipal wastewater treatment plants."); *see, e.g.,* 40 C.F.R. §§ 405.42 (establishing effluent limitations for facilities that process dairy products, specifically butter), 408.242 (establishing effluent limitations for facilities that process seafood, specifically clams shucked by machines), 417.72 (establishing effluent limitations for facilities that manufacture soap and detergent, specifically bar soap). Publicly Owned Treatment Works ("POTWs") are publicly owned sewage treatment plants that process domestic sewage and, in some cases, pre-treated industrial wastewater. 33 U.S.C. § 1292 (2012). After processing influent, the facilities discharge treated wastewater. *See id.*

[2] *See* NAT'L ACAD. SCIENCES, ASSESSING THE TMDL APPROACH TO WATER QUALITY MANAGEMENT 15–16 (2001) (report available for download at https://www.nap.edu/catalog/10146/assessing-the-tmdl-approach-to-water-quality-management [https://perma.cc/2HV9-MAGV]). Water quality-based effluent limitations are wastewater discharge standards that EPA or a state authority determines must be applied to ensure that a discharger is not potentially or actually contributing to water quality impairment. 33 U.S.C § 1312 (2012). Instead of being based on technological feasibility, these standards are derived from the chemical and biological needs of the waterbody to which discharge contributes effluent. *See id.*

[3] NAT'L ACAD. SCIENCES, *supra* note 2, at 1, 15. A watershed is an area of land in which all of the water that falls flows to a common point. *What is a Watershed?*, U.S. GEOLOGICAL SURVEY (Dec. 9, 2016), https://water.usgs.gov/edu/watershed.html [https://perma.cc/58XW-VULJ]. Smaller watersheds are nested within larger watersheds. *Id.*

[4] OFFICE OF INSPECTOR GEN., U.S. ENVTL. PROT. AGENCY, SUSTAINED COMMITMENT NEEDED TO FURTHER ADVANCE WATERSHED APPROACH 2–3 (2005), https://www.epa.gov/sites/production/files/2015-11/documents/20050921-2005-p-00025.pdf [https://perma.cc/J8BU-5LAL]. The agency has stated that the watershed approach:

> "[S]hould be the fulcrum of Federal and State restoration and protection efforts, and those of our many stakeholders, both private and public . . . [and] such an approach is one of the most important environmental guiding principles to maintain and restore the chemical, physical and biological integrity of the Nation's waters."

Id. (quoting the EPA's Implementation Plan for Subobjective 2.2.1, published in U.S. ENVTL. PROT. AGENCY, 2003–2008 STRATEGIC PLAN (2003)).

remains pervasive in waterbodies across the United States.[5] More than five thousand waterbodies are on EPA's impaired waters list because of nutrient impairments.[6] Moreover, nutrient pollution threatens some of the nation's most important water resources including the Chesapeake Bay, the Gulf of Mexico, the Florida Everglades, and the Great Lakes.[7]

EPA defines the watershed approach as a framework that combines public and private efforts to coordinate and prioritize challenges within hydrologically defined geographic areas.[8] The goal of a watershed approach is to develop and implement watershed plans with control measures that effectively protect and restore water quality.[9] To implement the watershed approach, EPA has advised the adaptation of CWA permit and other programs, not the creation of new programs.[10] For example, EPA now encourages: (1) balancing TMDL planning with implementation;[11] (2) using TMDL-alternative watershed plans that may more effectively address water quality concerns;[12] (3) using greater nuance in prioritizing impaired waterbodies for watershed plan development;[13]

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[5] U.S. ENVTL. PROT. AGENCY, EPA WATER QUALITY TRADING EVALUATION: FINAL REPORT, at ES-1 (2008) [hereinafter WATER QUALITY TRADING EVALUATION: FINAL REPORT], https://www.epa.gov/sites/production/files/2015-09/documents/epa-water-quality-trading-evaluation.pdf [https://perma.cc/JPU8-C8A9].

[6] Marc Ribaudo, *The Limits of Voluntary Conservation Programs*, CHOICES, 2d Quarter 2015, at 1, http://www.choicesmagazine.org/UserFiles/file/cmsarticle_425.pdf [https://perma.cc/VA8Y-EF3E]; *see* 40 C.F.R. § 130.7 (2016); *The Impaired Waters and TMDLs Program in Your EPA Region, State, or Tribal Land*, U.S. ENVTL. PROT. AGENCY (Mar. 3, 2017), https://www.epa.gov/tmdl/impaired-waters-and-tmdls-program-your-epa-region-state-or-tribal-land [https://perma.cc/F2S3-8ABW].

[7] Ribaudo, *supra* note 6, at 1.

[8] CAROL M. BROWNER, U.S. ENVTL. PROT. AGENCY, WATERSHED APPROACH FRAMEWORK 2 (1996), https://www.epa.gov/sites/production/files/2015-06/documents/watershed-approach-framework.pdf [https://perma.cc/3556-CXLM].

[9] *See id.* at 3–4.

[10] *See id.*

[11] U.S. ENVTL. PROT. AGENCY, NONPOINT SOURCE PROGRAM GRANTS GUIDELINES FOR STATES AND TERRITORIES 20 (2013) [hereinafter GUIDELINES FOR STATES AND TERRITORIES], https://www.epa.gov/sites/production/files/2015-09/documents/319-guidelines-fy14.pdf [https://perma.cc/6UV2-DHLV].

> States and EPA regions should ensure that a proper balance exists between funding the development and implementation of WBPs and TMDLs . . . . WBP and TMDL development should not be funded at a pace that significantly exceeds the pace of implementation because these plans may become outdated before they are implemented.

Id.

[12] U.S. ENVTL. PROT. AGENCY, A LONG-TERM VISION FOR ASSESSMENT, RESTORATION, AND PROTECTION UNDER THE CLEAN WATER ACT SECTION 303(d) PROGRAM 9 (2013) [hereinafter LONG-TERM VISION], https://www.epa.gov/sites/production/files/2015-07/documents/vision_303d_program_dec_2013.pdf [https://perma.cc/7SPG-AYKQ].

[13] *Id.* at 5.

and (4) integrating watershed compliance approaches into permits.[14] EPA also requires states to develop nine key element watershed plans for all watershed projects that will be implemented utilizing CWA section 319 nonpoint program funding.[15] In addition EPA has discussed the use of an adaptive management framework.[16]

Wisconsin is an ideal laboratory for further investigation of the watershed approach because it has taken practical steps to implement EPA's policy recommendations. Wisconsin has begun integrating the watershed approach into core programs, better integrating its core programs, and adopting an adaptive management approach. These efforts have encouraged collaboration among POTW, agricultural, and urban stormwater sources.[17] In addition, several of the state's POTWs, urban stormwater permittees, and land and water conservation departments have designed and begun to implement watershed plans.[18] Although, in most cases, watershed plan implementation has not yet proceeded to the point at which water quality improvements can be measured, the level of stakeholder engagement in plan development and implementation holds great promise for the restoration of nutrient impaired waterbodies and warrants further consideration of the state's policies.

This article focuses on watershed plans in Wisconsin that incorporate urban and agricultural precipitation-driven sources.[19] One of the most interesting and important aspects of watershed planning projects in Wisconsin is the degree to which they incorporate reductions from these sources. Urban stormwater and agricultural runoff sources continue to be major contributors to nutrient pollution nationwide and, historically, have been more challenging to address than POTW and industrial sources.[20] In focusing on urban and agricultural point sources however, this article does not intend to dispute that, in Wisconsin and other jurisdictions, further onsite pollutant load reductions from POTWs will be necessary to restore nutrient impaired waterbodies.[21]

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[14] U.S. ENVTL. PROT. AGENCY, WATERSHED-BASED NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITTING TECHNICAL GUIDANCE, 6–9 (2007), https://www3.epa.gov/npdes/pubs/watershed_techguidance.pdf [https://perma.cc/L9W4-RQ34].

[15] Sources of nutrient pollution under the CWA are classified as either point or nonpoint sources. 33 U.S.C. § 1329 (2012); GUIDELINES FOR STATES AND TERRITORIES, *supra* note 11 at 18–19; *see infra* notes 38- 41 and accompanying text.

[16] OFFICE OF INSPECTOR GEN., *supra* note 4, at 3.

[17] *See infra* notes 76–128 and accompanying text.

[18] *See infra* notes 76–82 and accompanying text.

[19] *See infra* notes 76–110 and accompanying text.

[20] Water Quality Trading Policy, 68 Fed. Reg. 1608, 1609 (Jan. 13, 2003); *see infra* notes 40–50 and accompanying text.

[21] *See* LONG-TERM VISION, *supra* note 12, at 11. EPA has not required, and many states have not adopted, technology-based secondary treatment standards for phosphorus discharges from POTWs. Nationwide only approximately ten percent of POTWs have technology-based limits in their permits. *See Action Towards Limiting Total Nitrogen, Total Phosphorous, and Total Inorganic Nitrogen Loads from NPDES-Permitted Facilities*, U.S. ENVTL. PROT. AGENCY (Mar. 30, 2017), https://www.

After presenting relevant background and a brief history of the watershed approach in federal policy, Part One of this article introduces innovative state water policies, which provide a foundation and framework for watershed planning and implementation in Wisconsin.[22] Part Two analyzes and provides recommendations for evolving Wisconsin's TMDL, urban stormwater, and nonpoint agricultural policies and discusses the development of a new funding mechanism to catalyze the next phase of watershed planning and implementation in the state.[23] Part Three reviews watershed plans and discusses, as case studies, POTW and urban stormwater permittees' watershed plans.[24] By providing concrete policy recommendations and in-depth analysis of watershed planning examples, this article aims to promote further progress in Wisconsin and guide other jurisdictions seeking to implement a watershed policy approach.

A. Relevant Background

To understand the watershed policy approach to nutrient pollution, it is necessary to understand what is meant by nutrient pollution, the primary

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epa.gov/nutrient-policy-data/action-towards-limiting-total-nitrogen-total-phosphorus-and-total-inorganic [https://perma.cc/X4E3-G49J]. Wisconsin, in contrast, established a technology-based phosphorus standard for POTWs in 1992 and has significantly reduced POTW phosphorus discharges through implementation of the standard. JIM BAUMANN ET AL., WISCONSIN'S NUTRIENT REDUCTION STRATEGY 32 (2013), http://dnr.wi.gov/topic/SurfaceWater/nutrient/combined_draft.pdf [https://perma.cc/RR2Z-QE94]. As of 2009, phosphorus discharges from POTWs had been reduced 67% from a 1995 baseline. *Id.* at 32–33. Because Wisconsin has implemented a technology-based standard, the potential additional reductions from POTWs are smaller in the state than in many other jurisdictions. In 2007, Natural Resources Defense Council petitioned EPA to establish technology based nutrient limits as part of the secondary treatment standards for POTWs. *See* Letter from Michael H. Shapiro, Deputy Assistant Adm'r, U.S. Envtl. Prot. Agency, to Ann Alexander, Nat. Res. Def. Council (Dec. 14, 2012). In a 2012 letter, EPA declined to do so. *Id.* As such, in other jurisdictions, watershed policy discussions may focus more on achieving further reductions from POTWs through the implementation of technology-based standards. *See e.g.* IOWA DEP'T OF AGRIC. & LAND STEWARDSHIP ET AL., IOWA NUTRIENT REDUCTION STRATEGY 1 (2012), http://www.nutrientstrategy.iastate.edu/sites/default/files/documents/NRS3.pdf [https://perma.cc/MH72-QFUZ]; KAN. DEP'T OF HEALTH & ENV'T, BUREAU OF WATER, SURFACE WATER NUTRIENT REDUCTION PLAN 14 (2004). Depending on the location of POTWs, other jurisdictions may also focus more on watershed plans consisting solely of coordination among POTWs. *See* U.S. ENVTL. PROT. AGENCY, NAT'L POLLUTION DISCHARGE ELIMINATION SYS., LONG ISLAND SOUND, CONNECTICUT 2 (2007), https://www3.epa.gov/npdes/pubs/wq_casestudy_factsht1.pdf [https://perma.cc/5BLP-J2XM]. In some areas it may be possible for POTWs to coordinate among themselves to achieve pollutant loading reductions, and coordination among POTWs would constitute a watershed planning approach. *See id.* at 2, 5. The Long Island Sound group permit demonstrates the efficiency and economic benefits that can be realized through a POTW watershed plan consisting solely of coordination between POTWs. *See id*. at 1–5. Through the Long Island Sound group permit, local POTWs have acted cooperatively to reduce overall and individual costs of implementing treatment technology necessary to achieve water quality goals. *See id.* at 2, 4–5.

[22] *See infra* notes 67–128 and accompanying text.

[23] *See infra* notes 129–289 and accompanying text.

[24] *See infra* notes 299–479 and accompanying text.

sources and effects of nutrient pollution, the mechanisms used to address these sources of pollution, and the available compliance options.

The term nutrient pollution causes confusion because most people think of nutrients as beneficial. The "nutrients" referred to in "nutrient pollution" include phosphorus and nitrogen.[25] If the concentration of these nutrients in a waterbody is within natural limits then the nutrients are, in fact, beneficial.[26] Naturally occurring amounts of nutrients promote healthy aquatic ecosystems. However, when nutrients in a waterbody are present in an amount that exceeds the waterbody's natural concentration, they become a pollutant.[27] Excess nutrients cause algae blooms—too much algae growth—in aquatic ecosystems.[28] Algae blooms can reduce or remove all oxygen from waterbodies, causing fish kills and dead zones.[29] In addition, some algae blooms contain toxins that are harmful, and sometimes fatal, to people and animals.[30] Too much nitrate in drinking water also causes a serious threat to infants.[31] If infants consume water with unsafe nitrate levels they can become seriously ill or die when nitrates bind to the hemoglobin in their blood and prevent oxygen flow to their tissues—a condition known as blue baby syndrome.[32]

The main sources of nutrient pollution are POTWs, urban stormwater, and agricultural runoff.[33] POTWs contribute nutrient pollution to waterbodies when they discharge sewage treatment process wastewater from facility pipes into waterbodies.[34] Agricultural and urban precipitation-driven sources contribute nutrient pollution when precipitation events flow over urban or agricultural land areas and wash sediment-bound and soluble nutrients into waterways.[35] In the case of agriculture, wet weather events wash nutrient-dense animal manure and excess fertilizer into waterways.[36] In urban areas, stormwater runoff carries nutrients found in fertilizers, pet waste, and yard waste into waterways.[37]

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[25] *Nutrient Pollution: The Problem*, U.S. ENVTL. PROT. AGENCY (Mar. 10, 2017), https://www.epa.gov/nutrientpollution/problem [https://perma.cc/R5TW-Q6D9].

[26] *See id.*

[27] *Id.*

[28] *Id.*

[29] *Nutrient Pollution: The Effects: Environment*, U.S. ENVTL. PROT. AGENCY (Mar. 10, 2017), https://www.epa.gov/nutrientpollution/effects-environment [https://perma.cc/56Q6-R7AY].

[30] *Id.*; *Nutrient Pollution: The Effects: Human Health*, U.S. ENVTL. PROT. AGENCY (Mar. 10 2017), https://www.epa.gov/nutrientpollution/effects-human-health [https://perma.cc/9S5Z-4C95].

[31] *Nutrient Pollution: The Effects: Human Health*, *supra* note 30.

[32] *Id.*

[33] *Nutrient Pollution: Sources and Solutions*, U.S. ENVTL. PROT. AGENCY (Mar. 10, 2017), https://www.epa.gov/nutrientpollution/sources-and-solutions [https://perma.cc/N6G3-C9QT]. In addition, in some areas, septic systems are a significant source of phosphorus pollution. *Id.*

[34] *See id.*

[35] *See id.*

[36] *See id.*

[37] *See id.*

Sources of nutrient pollution are classified under the CWA as either point or nonpoint sources.[38] POTWs are classified as point sources under the CWA, because they discharge pollutants through discrete pipes.[39] Because some or all of the polluted stormwater from urban areas runs through stormwater pipes into waterbodies, municipal separate storm sewer entities ("MS4s") are also characterized as point sources under the CWA.[40] In contrast, with the exception of concentrated animal feeding operations, the polluted runoff from agricultural areas is not considered to be carried via discrete conveyances into waterbodies. Agriculture is therefore treated as a nonpoint source under the CWA.[41]

The distinction between point and nonpoint sources is important because the CWA applies different mechanisms to these two types of sources.[42] Point sources are required to obtain National Pollutant Discharge Elimination System ("NPDES") permits prior to discharging into waters of the United States, but there is no parallel permitting requirement for nonpoint sources.[43] Instead, the CWA encourages control of nonpoint source pollutant loading through nonpoint planning and grant programs.[44] Point source NPDES permits can include two types of standards. Technology-based effluent limits are the default and represent the minimum level of required controls.[45] Permits may also contain water quality-based effluent limits ("WQBELs") when technology-based effluent limits are not sufficient to protect water quality.[46] WQBELs are permit limits pegged to water quality standards instead of a level of achievable technology.

Sources employ different types of control measures to reduce their pollutant loads, whether as required by permits (point sources) or voluntarily (nonpoint sources).[47] The type of control measure a source utilizes depends, in part, on whether its loading contribution is continuously generated onsite or is precipitation-driven. Nutrients in the continuous discharge stream from a POTW or industrial source can be reduced through installation of onsite technologies

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[38] 33 U.S.C. § 1362 (2012).

[39] *See id.* § 1362(14). The statute defines point source as:

> [A]ny discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture.

Id.

[40] *See id.*

[41] *See id.* § 1362. The Clean Water Act (CWA) does not define nonpoint source. *See id.*

[42] *See id.* §§ 1311, 1314, 1329, 1362 (2012).

[43] *Id.* §§ 1311(a), 1342, 1362(12).

[44] *Id.* § 1329.

[45] *Id.* § 1311(b), 1314(b).

[46] *Id.* § 1312(a) (2012); 40 C.F.R. § 122.44(d)(1) (2016).

[47] *Id.* §§ 1311(b), 1314(b).

that filter out pollutants before wastewater is discharged through a facility's discharge pipe. In contrast, addressing nutrients in the intermittent, precipitation-driven discharge and runoff from MS4 and agricultural sources requires implementing land use best management practices ("BMPs") in urban and agricultural land areas to reduce the flow of precipitation carrying nutrients from these areas.[48] When it is less costly and allowed under applicable law, point sources may choose to comply with their permit requirements through trades or similar transactions with other sources.[49] In those cases, a purchasing point source would pay a generating point or nonpoint source to implement technology or BMPs that reduce pollutant loading by the amount required for compliance with the purchasing source's permit.

The CWA also includes planning mechanisms.[50] In addition to the nonpoint planning program, the TMDL planning mechanism is particularly relevant to addressing nutrient impaired waterbodies.[51] TMDLs are waterbody plans that must be developed when technology-based standards in permits are not sufficient to protect water quality.[52] TMDLs establish the load of pollutants from point, nonpoint, and background sources that a waterbody can assimilate without violating water quality standards.[53] In essence, TMDLs establish pollutant diets for impaired waterbodies. TMDL provisions in the CWA and implementing regulations do not explicitly require control measure identification or implementation.[54] Nevertheless, TMDLs are partially implemented through

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[48] *See id.* § 1329(a)(1)(C), (b)(2)(A). In addition to Best Management Practices ("BMPs"), in pipe technologies are also available for urban stormwater infrastructure. *See, e.g.,* STEVEN R. CORSI ET AL., U.S. GEOLOGICAL SURVEY, EVALUATION OF THE MULTI-CHAMBERED TREATMENT TRAIN, A RETROFIT WATER-QUALITY MANAGEMENT DEVICE 1 (1999), https://pubs.usgs.gov/of/1999/0270/report.pdf [https://perma.cc/CKK2-SZVF].

[49] *See infra* notes 102–110 (discussing trading and adaptive management) and 323–479 (offering case studies of various programs) and accompanying text.

[50] 33 U.S.C. § 1313(e).

[51] *See* 33 U.S.C. § 1313(d)(1)(C); 40 C.F.R. §§ 130.2(i), 130.7 (2016); U.S. GOV'T ACCOUNTABILITY OFFICE, CLEAN WATER ACT: CHANGES NEEDED IF KEY EPA PROGRAM IS TO HELP FULFILL THE NATION'S WATER QUALITY GOAL 2, 15 (2013) [hereinafter CLEAN WATER ACT: CHANGES NEEDED], https://www.gao.gov/assets/660/659496.pdf [https://perma.cc/4EF5-Q52W].

> [T]he agency's regulations refer to a TMDL generally as a calculation or formula used to address one pollutant in one particular part of a water body, but as the program has evolved, the concept of a TMDL has become more expansive. Overall, the goal of developing a TMDL is to end up with a plan, including the actions needed, to meet water quality standards and restore impaired water bodies.

Id. at 2.

[52] 33 U.S.C. § 1313(d)(1)(C); 40 C.F.R. §§ 130.2(i), 130.7.

[53] 33 U.S.C. § 1313(d)(1)(C); 40 C.F.R. §§ 130.2(i), 130.7.

[54] *See* 33 U.S.C. § 1313(d)(1)(C); 40 C.F.R. §§ 130.2(i), 130.7; CLEAN WATER ACT: CHANGES NEEDED, *supra* note 51, at 15–17. In 1996, EPA convened a committee to evaluate the Total Maximum Daily Load ("TMDL") program. CLEAN WATER ACT: CHANGES NEEDED, *supra* note 51, at 15. The committee made several recommendations centered on enhancing and investing greater resources in the TMDL program. *Id.* at 15–16. In 2000, in part in response to these recommendations, EPA

the incorporation of WQBELs into point source NPDES permits.[55] TMDL pollutant load allocations for agricultural sources that are not required to obtain permits cannot be similarly implemented and enforced through the permit mechanism. In some cases, agricultural sources that are not required to obtain permits may implement BMPs necessary to achieve TMDLs voluntarily, pursuant to state requirements or as part of their participation in federal Farm Bill conservation programs.

B. History of the Watershed Approach in Federal Water Policy

The watershed approach is not new to federal water policy. When Congress enacted the Water Pollution Control Act in 1948 and the Water Quality Act of 1965, the laws provided for the use of water quality-based standards rather than technology standards.[56] Specifically, Congress required EPA and states to identify sources affecting water quality and implement sufficient controls on those sources to improve water quality.

The Water Pollution Control and Water Quality Acts, though, failed to achieve their water quality goals.[57] This failure occurred because at the time these laws were in operation, EPA and states lacked necessary monitoring data and analytical tools.[58] Without these, regulators could not defend water quality-based requirements for individual sources when those sources disputed their relative responsibility for pollutant loading and their impact on water quality.[59]

In 1972, to overcome challenges with applying water quality-based standards in the Water Pollution Control and Water Quality Acts, Congress revised those laws.[60] They amended the water quality-based standard provisions and

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proposed revised TMDL rules that specified, *inter alia*, an implementation plan component. *Id.* at 16. At around the same time, the Government Accountability Office issued a report stating that only three states felt that they had sufficient data to develop TMDLs for waterbodies with nonpoint sources. *See* U.S GEN. ACCOUNTING OFFICE, WATER QUALITY: KEY EPA AND STATE DECISIONS LIMITED BY INCONSISTENT AND INCOMPLETE DATA 50 (2000), http://www.gao.gov/assets/160/156770.pdf [https://perma.cc/W85J-C9W7]. Following EPA's revised rule proposal and the publication of the GAO report, Congress prohibited the agency from using funds for fiscal years 2000 and 2001 to finalize or implement its revised rules. U.S. GOV'T ACCOUNTABILITY OFFICE, *supra*, at 16. In addition, through provisions included in the 2001 appropriations bill, Congress required EPA to contract with the National Research Council ("NRC") to evaluate the adequacy of data and analytical methods for administering the TMDL program. *Id.* Although EPA finalized its revised TMDL rule, it delayed its effective date and, in 2002, after the issuance of the NRC report, EPA ultimately withdrew its revised rule. *Id*. Since that time, EPA has included similar implementation provisions in its TMDL guidance documents for states and EPA Regional administrators. *Id.*

[55] 40 C.F.R. § 122.44(d)(1)(vii) (2016).

[56] *See* 33 U.S.C. §§ 466–466g (1970); *id.* §§ 407–409, 431–437 (1952).

[57] NAT'L ACAD. SCIENCES, *supra* note 2, at 12–13.

[58] *Id.*

[59] *Id.*

[60] *Id.* at 13; *see* Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, 85 Stat. 816 (codified as amended in scattered sections of 33 U.S.C.). Congress enacted additional, substantial amendments to the Water Pollution Control Act in 1977 and 1987. *See* Water Quality Act

added technology-based standard provisions. Instead of only having the option of starting with water quality and working backward to assign pollution limits to sources, the revised law also allowed states and the EPA to apply technology-based standards to POTWs and other industrial sources.[61] In this way, the law enabled states and EPA to address water quality without substantial data on individual source discharges or analytical methods for separating and analyzing the impacts of individual discharges on water quality. In 1987, Congress also added the MS4 NPDES permit and nonpoint planning programs, but despite these additions, implementation continued to focus on applying technology-based standards to POTWs and industrial sources.[62] This point source technology-based approach substantially reduced some pollutants but failed to effectively address nutrient pollution.[63]

In the 1990s, citizens and environmental organizations sued EPA, alleging that the agency had failed to hold states accountable for developing TMDLs for impaired waterbodies. These lawsuits pushed EPA to shift the focus of national water quality policy once again back to the water quality-based approach originally envisioned in the Water Pollution Control and Water Quality Acts.[64] Since the time of the citizen suits, EPA has maintained this focus and states have developed nearly 50,000 TMDLs.[65] Despite EPA's and states' focus on TMDLs, nutrient impairment continues to plague waterbodies across the United States.[66]

I. Policies Forming the Foundation and Framework for Watershed planning and Implementation in Wisconsin

This section addresses innovative policies that provide the foundation and framework for watershed planning and implementation in Wisconsin. This section does not provide an exhaustive list of relevant policies and programs. Instead, it includes an overview of Wisconsin's numeric water quality standards for phosphorus, impaired waterbody listing procedures, precipitation-driven

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of 1987, Pub. L. No. 100-4, 101 Stat. 7 (codified as amended in scattered sections of 33 U.S.C.); Clean Water Act of 1977, Pub. L. No. 95-217, 91 Stat. 1566 (codified as amended in scattered sections of 33 U.S.C.). The policies contained in these three waves of amendments comprise the modern CWA. Nat'l Acad. Sciences, *supra* note 2, at 12; *see* Water Quality Act of 1987, Pub. L. No. 100-4, 101 Stat. 7 (codified as amended in scattered sections of 33 U.S.C.); Clean Water Act of 1977, Pub. L. No. 95-217, 91 Stat. 1566 (codified as amended in scattered sections of 33 U.S.C.); Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, 85 Stat. 816 (codified as amended in scattered sections of 33 U.S.C.).

[61] Nat'l Acad. Sciences, *supra* note 2, at 12–13.

[62] *See id.* at 12–14; *supra* notes 48–55 and accompanying text.

[63] Water Quality Trading Evaluation: Final Report, *supra* note 5, at ES-1; Nat'l Acad. Sciences, *supra* note 2, at 1.

[64] Nat'l Acad. Sciences, *supra* note 2, at 12–13.

[65] *See* Clean Water Act: Changes Needed, *supra* note 51, at 3.

[66] *Nutrient Pollution: The Problem*, *supra* note 25.

source policies, and point source adaptive management program. These policies are highlighted because they have been integral to the development and implementation of watershed plans in Wisconsin. Both current and former programs are discussed. This section also addresses Wisconsin's Nutrient Reduction Strategy and Integrated Assessment of Watershed Health.

EPA has delegated Wisconsin the authority to administer CWA programs including the TMDL, NPDES stormwater permit, and nonpoint programs. Wisconsin's efforts to carry out these programs have also encouraged the development and implementation of watershed plans in the state. Because this article suggests amendments to these programs could facilitate a pathway to the next phase of watershed plan development and implementation in Wisconsin, more substantial overviews and recommendations for these programs are provided separately in Part Two.[67]

A. Numeric Water Quality Standards

Water quality standards provide uniform, science-based targets for watershed planning. In 2010, after a three-year development process, Wisconsin adopted and EPA approved statewide numeric phosphorus standards, making Wisconsin one of a handful of states that has adopted numeric standards for this pollutant.[68] For forty-six specifically identified rivers, the standard is .1 mg/L.[69] For all other streams, unless exempted, the standard is .075 mg/L.[70] For lakes and reservoirs, the standards range from .015 mg/L for lakes that support cold water fisheries to .040 mg/L for shallow lakes and reservoirs.[71] For the open and near shores of Lake Superior, the standard is .005 mg/L and for the open and near shore waters of Lake Michigan the standard is .007 mg/L.[72] The state may modify these standards and apply site-specific standards

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[67] *See infra* notes 129–298 and accompanying text.

[68] *See* BAUMANN ET AL., *supra* note 21, at 87–88; *State Progress Toward Developing Numeric Nutrient Water Quality Criteria for Nitrogen and Phosphorus*, U.S. ENVTL. PROT. AGENCY (May 8, 2017), https://www.epa.gov/nutrient-policy-data/state-progress-toward-developing-numeric-nutrient-water-quality-criteria [https://perma.cc/RGJ9-NGF9]. Wisconsin, working with the U.S. Geologic Survey, used a phosphorus zone approach to develop its numeric phosphorus standards. The state looked at response variables relative to different types of physical features including soil type and topography. The state gathered one year of data at approximately 300 sites and completed two years of statistical analysis to identify its standards. Interview with Jim Baumann, Water Quality Eng'r, Wis. Dep't of Nat. Res., in Madison, Wis. (June 8, 2016) [hereinafter Baumann Interview]; *see* DALE M. ROBERTSON ET AL., U.S. GEOLOGICAL SURVEY, NUTRIENT CONCENTRATIONS AND THEIR RELATIONS TO THE BIOTIC INTEGRITY OF WADEABLE STREAMS IN WISCONSIN 8, 10 (2006), https://pubs.usgs.gov/pp/pp1722/pdf/PP_1722.pdf [https://perma.cc/5BBN-7STW].

[69] WIS. ADMIN. CODE N.R. § 102.06(3)(a) (2010).

[70] *Id.* § 102.06(3)(b).

[71] *Id.* § 102.06(4).

[72] *Id.* § 102.06(5)(a)–(b).

in some cases.[73] The state's numeric phosphorus standards have provided clarity and a more level playing field for stakeholders, planners, regulators, and the regulated community. Wisconsin has used these standards to develop WQBELs, nutrient TMDLs, and the state's Nutrient Reduction Strategy.

B. Refined 303(d) Impaired Waters Listing Policy

Impaired waterbody listing policies can guide decisions about the appropriate type of watershed plans for impaired waterbodies and better coordinate the timing of TMDL development. Wisconsin has developed a nuanced 303(d) impaired waterbody listing approach that incorporates different types of available TMDL-alternative planning approaches, including adaptive management plans or pilot projects, lake district plans, and other CWA section 319-funded nonpoint source watershed plans.[74] Wisconsin's listing approach also helps to coordinate the timing of TMDL development by deprioritizing TMDL development if impaired waterbodies are being addressed through TMDL-alternative plans. This nuanced listing approach is not new. During the tenure of the Environmental Accountability Project ("EAP") program, Wisconsin used a similar refined listing approach to deprioritize TMDL development for areas covered by EAP plans.[75]

C. Precipitation-driven Source Policies

To address urban and agricultural precipitation-driven pollutant loading through a watershed approach, planners must develop watershed plans that identify and target land use BMPs and then implement, monitor and adapt the same. Stakeholders' recent successes implementing watershed plans in the state, discussed below in Part Three, did not occur in a vacuum.[76] Decades of practice developing and implementing plans through innovative watershed planning programs designed to address urban and agricultural loading primed the pump.

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[73] *Id.* § 102.06(7).

[74] WIS. DEP'T OF NAT. RES., WISCONSIN'S NONPOINT SOURCE PROGRAM MANAGEMENT PLAN FFY 2016–2020, at 22–23 (2015) [hereinafter NONPOINT SOURCE PROGRAM MANAGEMENT PLAN], http://dnr.wi.gov/topic/Nonpoint/documents/NPSProgramManagementPlan20162020.pdf [https://perma.cc/FPK3-Z4EL]; *see* WIS. STAT. § 33.235 (2017); *infra* notes 104–116 and accompanying text (discussing Wisconsin's Adaptive Management program). Under Wisconsin's Lake District program, lake districts can work with the state environmental agency to complete lake planning studies and receive cost-share funding to implement plans. WIS. STAT. § 33.235 (2017).

[75] *See infra* notes 82–89 and accompanying text (discussing Environmental Accountability Project).

[76] *See infra* notes 299–479 and accompanying text.

1. First Generation Precipitation-Driven Source Policies

a. Priority Watershed Priority Lake Program

Wisconsin began implementing innovative watershed planning programs to address precipitation-driven pollutant loading in 1978, after the TMDL program had begun but almost ten years before Congress enacted the CWA nonpoint planning program. At that time, Wisconsin started its Priority Watershed and Priority Lake nonpoint planning program ("PWPL"). The PWPL program required the development of restoration plans that jointly addressed urban and agricultural pollutant loading to impaired waterbodies.[77]

Working within the PWPL program, planners were required to develop watershed plans identifying water quality problems and threats, water quality objectives, BMPs sufficient to meet water quality standards, critical sites, supplementary wildlife or natural resource concerns, and necessary local ordinances.[78] In addition, planners were required to develop and execute implementation plans.[79] PWPL plan development and implementation requirements went above and beyond the TMDL program requirements and eventually served as the blueprint for EPA's nine key element plan.[80] By the end of 2008, Wisconsin had resolved ninety-three percent of 1657 critical sites with few enforcement actions.[81] As it transitioned to the Nonpoint Source Performance Standards program, discussed below, the state ended the PWPL program in 2009.[82]

b. Environmental Accountability Project Program

In 2003, to better integrate its work under the PWPL program with its TMDL program and receive TMDL credit from EPA for its PWPL planning efforts, Wisconsin worked with EPA Region 5 to develop the EAP program.[83] Projects completed under the EAP Program were formally recognized by EPA, and, as such, could be used instead of TMDLs to address impaired waters on

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[77] NONPOINT SOURCE PROGRAM MANAGEMENT PLAN, *supra* note 74, at 9.

[78] WIS. ADMIN. CODE N.R. § 120.08(1)(b) (2017).

[79] *Id.* § 120.08(1)(c). Implementation plans were required to include, *inter alia*, (1) a five year schedule for completing a land use inventory; (2) schedules for rural and urban implementation activities; a staff strategy for directing efforts in accordance with site priority rankings; (3) cost estimates/grant information; (4) information and education strategies; (5) technical assistance needs; relevant state and local regulatory frameworks; (6) performance measures; and (7) a strategy for measuring progress. *Id.*

[80] *See* NONPOINT SOURCE PROGRAM MANAGEMENT PLAN, *supra* note 74, at 43–51; Bauman Interview, *supra* note 68.

[81] NONPOINT SOURCE PROGRAM MANAGEMENT PLAN, *supra* note 74, at 9.

[82] *See id.*

[83] Email from Cynthia Curtis, Envtl. Sci., Nonpoint Source Program, U.S. Envtl. Prot. Agency, to author (Oct.17, 2016, 08:42 EST) (on file with author).

the state's 303(d) impaired waters list.[84] When EAP plans were developed to address an impaired waterbody, Wisconsin used its impaired waters listing process to deprioritize TMDL development for that waterbody.[85] However, if Wisconsin did not meet the milestones indicated in an EAP plan, EPA could require the state to move the project to a TMDL track.[86]

Before Wisconsin discontinued the EAP program in 2011, stakeholders completed and implemented approximately ninety-four watershed plans, giving land and water conservation departments, municipalities, agricultural producers, and other stakeholders significant experience working together to implement these plans.[87] The PWPL and EAP programs created a solid foundation of people, practical knowledge and technical experience on which the state and stakeholders continue to build.[88]

2. Current Precipitation-driven Source Policies

a. Nonpoint Source Performance Standards Program

Wisconsin's Nonpoint Source Performance Standards ("NSPS") program provides uniform minimum performance standards for control measures in agricultural, urban and transportation land areas.[89] In the agricultural sector, minimum standards include those for phosphorus delivery, cropland erosion, livestock and manure storage management, nutrient management, and livestock process wastewater.[90] These performance standards incorporate the U.S. Natural Resources Conservation Service ("NRCS") technical requirements applicable to federal conservation practices.[91] Agricultural NSPS are quasi-regulatory. To require agricultural producers to implement performance standards the state must determine that a minimum seventy percent cost share is available for implementation.[92]

Urban performance standards for municipalities subject to stormwater permit regulations include construction site standards, post construction stand-

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[84] *Id.*

[85] *See* Nicole Richmond, TMDL Coordinator, Wis. Dep't of Nat. Res., Address at National Workshop to Advance State TMDL Programs, Environmental Accountability Projects: Alternatives to Address Impaired Waters in Wisconsin and Other Region 5 States (June 24, 2008), https://www.eli.org/sites/default/files/docs/tmdl/TMDL.Session4.Richmond_000.pdf [https://perma.cc/QA66-HZKZ]. Environmental Accountability Projects ("EAP") were listed as "implementation priority" instead of high, medium, or low priority for TMDL development.

[86] Richmond, *supra* note 85.

[87] Baumann Interview, *supra* note 68.

[88] *See infra* note 195 and accompanying text.

[89] NONPOINT SOURCE PROGRAM MANAGEMENT PLAN, *supra* note 74, at 10.

[90] *Id.*; *see* WIS. ADMIN. CODE ATCP §§ 50.61–50.98 (2017) (setting various performance standards for Wisconsin's agricultural sector).

[91] *See* WIS. ADMIN. CODE ATCP §§ 50.61–50.98.

[92] WIS. ADMIN. CODE NR § 151.09(4)(d)(2)(b) (2017).

ards for new development and redevelopment, peak discharge and infiltration requirements for BMPs and a Total Suspended Solids ("TSS") percent reduction requirement.[93] Under the TSS percent reduction requirement, within two years of permit coverage, municipalities must reduce TSS loading by twenty percent, or to the maximum extent practicable, as compared to a no controls scenario.[94] All NPDES-permitted municipalities have submitted stormwater management plans for achieving the twenty percent TSS reduction requirement.[95] Some municipalities have worked together toward NSPS compliance through the use of watershed planning.[96]

b. Land and Water Resource Management Program

While Wisconsin works to implement the urban stormwater NSPS for municipalities through its NPDES permit program, addressed below in Part Two, it relies heavily on its Land and Water Conservation Departments ("LWCDs") to develop Land and Water Resource Management ("LWRM") plans and to work with producers to implement agricultural NSPS in accordance with these plans.[97] LWRM plans must include, *inter alia*, water and soil quality assessments, water quality objectives, BMPs to achieve water and soil objectives, a multiyear description of prioritized activities, a monitoring system, an information and education strategy, and methods for interagency coordination.[98] However, because of limited funding, differences in technical capacity and a lack of planning staff, the depth of plan development varies significantly across the state. Despite the removal of the watershed focus provided by the previous PWPL and EAP programs, in some cases, LWCDs are proactively executing LWRM plans for watershed areas instead of county jurisdictions.[99]

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[93] *Id.* §§ 151.10–151.15 (2017).

[94] *Id.* § 151.13(2)(b)(1)(b). Wisconsin's administrative regulations also state a requirement for a forty percent reduction of Total Suspended Solids ("TSS"). *Id.* § 151.13(2)(b)(2)(a)–(b). However, in 2011, the Wisconsin legislature approved Act 32, which prohibited the Wisconsin Department of Natural Resources from enforcing the forty percent reduction requirement. WIS. DEP'T OF NAT. RES., BUREAU OF WATERSHED MGMT., TMDL GUIDANCE FOR MS4 PERMITS: PLANNING, IMPLEMENTATION, AND MODELING GUIDANCE 5 (2014) [hereinafter TMDL GUIDANCE FOR MS4 PERMITS], http://dnr.wi.gov/news/input/documents/guidance/ms4guidancefinal.pdf [https://perma.cc/5BUM-RDAG].

[95] E-mail from Bryan Hartsook, Water Res. Eng'r, Wis. Dep't of Nat. Res, to author (Oct. 17, 2016, 10:34 CST) [hereinafter Hartsook Oct. 17 Email] (on file with author).

[96] *See infra* notes 454–479 and accompanying text (discussing the Menomonee River Group MS4 individual permit).

[97] WIS. DEP'T OF NAT. RES., IMPLEMENTATION STRATEGY FOR NR 151—AGRICULTURAL NONPOINT PERFORMANCE STANDARDS AND PROHIBITIONS 1, 4 (2003), http://dnr.wi.gov/topic/nonpoint/documents/strategy151.pdf [https://perma.cc/4D93-ML48]; *see infra* notes 129–298 and accompanying text.

[98] WIS. ADMIN. CODE ATCP § 50.12(2) (2016).

[99] *See infra* notes 299–301 and accompanying text (discussing Brown and Outagamie watershed plans).

D. Point Source Policies

Wisconsin has several point source programs. For example, Wisconsin has a water quality trading program and EPA recently approved a statewide variance program.[100] In addition to these programs, since 2010, Wisconsin has had an adaptive management program. This section provides an overview of Wisconsin's adaptive management program because, unlike the state's trading and statewide variance programs, the adaptive management program has played a substantial role in shaping watershed plan development and implementation in the state.[101]

1. Adaptive Management Program

Created in 2010, the adaptive management program is a NPDES permit compliance approach for phosphorus and TSS WQBELs.[102] A POTW can utilize the adaptive management compliance approach if it is located in a watershed where water quality impairment is caused by both point and nonpoint sources—with nonpoint sources contributing at least fifty percent of pollutant loading—and the POTW would otherwise have to use filtration or a similar technology to meet applicable WQBELs.[103] Under the adaptive management approach, a permittee must develop a watershed plan to achieve water quality standards in a specified area. The plan provides a road map for achieving verifiable reductions in pollutant loading from point and nonpoint sources. Permittees are to use monitoring and modeling data to verify pollutant loading reduc-

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[100] WIS. STAT. §§ 283.16, 283.84 (2017); *see* WIS. DEP'T OF NAT. RES., SUBSTANTIAL AND WIDESPREAD ADVERSE SOCIAL AND ECONOMIC IMPACTS OF WISCONSIN'S PHOSPHORUS REGULATIONS 75 (2015), http://dnr.wi.gov/topic/surfaceWater/documents/phosphorus/PreliminaryDetermination.pdf [https://perma.cc/Z5RZ-LULG] (providing information on the phosphorus discharge variance program). *See generally* WIS. DEP'T OF NAT. RES., A WATER QUALITY TRADING HOW TO MANUAL (2013) [hereinafter WISCONSIN WATER QUALITY TRADING HOW TO], http://dnr.wi.gov/topic/surfacewater/documents/wqt_howto_9_9_2013signed.pdf [https://perma.cc/QK7C-8RV3] (providing point sources with guidance on water quality trading). Wisconsin submitted its multi-discharger variance package to EPA on March 29, 2016. Letter from Cathy Stepp, Secretary, Wis. Dep't of Nat. Res., to Tinka Hyde, Dir., Water Div., U.S. Envtl. Prot. Agency, Region 5, (March 29, 2016), ftp://dnrftp01.wi.gov/geodata/water_division/phosphorus/mdv/MDV_Cover_Letter.pdf (this source can be found online by doing a Google search for "Letter from Cathy Stepp to Tinka Hyde March 29"). EPA approved the variance option on February 6, 2017. *Statewide Phosphorus Multi-Discharger Variance*, WIS. DEP'T OF NAT. RES. (Mar. 17, 2017), http://dnr.wi.gov/topic/surfacewater/phosphorus/statewidevariance.html [https://perma.cc/K7VW-JP95].

[101] *See infra* notes 102–110 and accompanying text (providing an overview of watershed plans developed under the Adaptive Management program).

[102] WIS. STAT. § 283.13(7).

[103] WIS. ADMIN. CODE NR § 217.18(2) (2016). If nonpoint sources do not contribute fifty percent of pollutant loading, the permittee may still be able to use adaptive management if they can show that water quality criterion cannot be met without additional controls on nonpoint sources. *Id.* § 217.12(2)(b).

tions and adjust the plan to ensure the effective restoration of water quality.[104] Permittees may be allowed up to four permit terms to achieve final in-stream water quality goals.[105] During the implementation period, permittees must meet interim effluent limitations of .6/mg L and .5 mg/L.[106]

Historically, POTWs and other point sources have looked to onsite technology control measures to meet end-of-pipe technology-based standards in their permits. Under the adaptive management program, instead of proceeding directly to the next level of more expensive technology to meet end-of-pipe WQBELs, a POTW permittee partners with other point and nonpoint sources in a watershed action area to restore water quality standards in-stream.[107] The goal of achieving water quality standards in-stream distinguishes adaptive management from technology and water quality trading compliance approaches, which focus on meeting a permittee's end-of-pipe effluent limits. If a permittee succeeds in using an adaptive management approach to restore in-stream water quality, it may avoid costly facility treatment upgrades and the possibility of successive rounds of increasingly stringent WQBELs.[108]

In addition to providing a framework for watershed plan development and implementation, the state's adaptive management policy has integrated the wa-

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[104] WIS. STAT. § 283.13(7)(a).

[105] *Id.* § 283.13 (7)(b); *see* WIS. DEP'T OF NAT. RES., ADAPTIVE MANAGEMENT TECHNICAL HANDBOOK: A GUIDANCE DOCUMENT FOR STAKEHOLDERS 56 (2013) [hereinafter ADAPTIVE MANAGEMENT TECHNICAL HANDBOOK], http://dnr.wi.gov/topic/surfacewater/documents/adaptivemanagement handbooksigned.pdf [https://perma.cc/K8LF-4XVG] ("In the first permit term, the adaptive management applicant must, at minimum, demonstrate that its contributing phosphorus load to the watershed will be offset through nonpoint or other point source reductions.").

[106] WIS. ADMIN. CODE NR § 217.18 (3)(e).

[107] ADAPTIVE MANAGEMENT TECHNICAL HANDBOOK, *supra* note 105, at 27–28.

> The adaptive management "action area" should include the watershed(s) or subwatershed(s) that adaptive management activities will occur in, or can occur in if needed. The size of the action area will be a case-by-case determination and must be of sufficient size to reduce phosphorus by the percent commensurate with the load or by the percent required to achieve water quality criteria, whichever is smallest . . . . The action area should not expand beyond the 12 digit Hydrologic Unit Code sub-basin, or HUC 12, where the point source(s) are located. Also, the action area should be upstream of the point source(s) involved with the adaptive management plan, if possible . . . . [T]he outfall location should be the furthest downstream point of the adaptive management action area and used as the final point of compliance [point of standards application] to demonstrate water quality improvements for adaptive management . . . . WDNR may approve an alternative adjacent HUC 12, a larger HUC (such as a HUC 10), or a downstream action area. Scenarios where alternative action areas may be approved include point sources discharging to effluent dominated stream segments, waters dominated by residual phosphorus loads, or waters with a United States Environmental Protection Agency (EPA) approved TMDL.

Id.

[108] ADAPTIVE MANAGEMENT TECHNICAL HANDBOOK, supra note 105, at 11; *see* WIS. ADMIN. CODE NR § 140.22 (2017).

tershed approach into the state's POTW permit program and better integrated the states POTW, urban stormwater, and agricultural runoff programs. POTWs and urban stormwater partners, have developed and begun implementing watershed plans under the adaptive management program.[109] In addition, one POTW has completed, and another has begun implementing, pilot watershed planning projects utilizing this approach.[110] As with plans developed by stakeholders under the PWPL and EAP programs, permittees working with the adaptive management program are developing watershed plans that incorporate urban and agricultural sources. Most importantly, they are working to *implement* the plans, rather than developing them for informational purposes only.

E. Relevant Non-Regulatory Programs

1. Nutrient Reduction Strategy

Between 2008 and 2013, as part of EPA's Action Plan for the Mississippi/Gulf of Mexico Watershed Nutrient Task Force, Wisconsin developed its Nutrient Reduction Strategy.[111] Wisconsin's integrated strategy not only addresses nutrient loading to the Mississippi River, but also loading to in-state waters and to Lake Michigan.[112] To develop its Nutrient Reduction Strategy, Wisconsin monitored phosphorus and nitrogen levels on a monthly basis for one year at the pour points of approximately 354 Hydrologic Unit Code[113]

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[109] *See infra* notes 299–479 and accompanying text.

[110] *See infra* notes 393–426 and accompanying text.

[111] *See Hypoxia Task Force 2008 Action Plan and Related Documents*, U.S. ENVTL. PROT. AGENCY, MISS. RIVER/GULF OF MEX. TASK FORCE (Apr. 6, 2017), https://www.epa.gov/ms-htf/hypoxia-task-force-2008-action-plan-and-related-documents [https://perma.cc/T3NK-NLBU]. In 2008, EPA developed an Action Plan for the Mississippi/Gulf of Mexico Watershed Nutrient Task Force. *Id.* The plan calls on states in the Mississippi River Basin, by 2013, to develop strategies to reduce the amount of phosphorus and nitrogen carried in rivers to the Gulf of Mexico by forty-five percent. U.S. ENVTL. PROT. AGENCY, MISSISSIPPI RIVER/GULF OF MEXICO WATERSHED NUTRIENT TASK FORCE GULF HYPOXIA ACTION PLAN 2008 FOR REDUCING, MITIGATING, AND CONTROLLING HYPOXIA IN THE NORTHERN GULF OF MEXICO AND IMPROVING WATER QUALITY IN THE MISSISSIPPI RIVER BASIN 22–23 (2008), https://www.epa.gov/sites/production/files/2015-03/documents/2008_8_28_msbasin_ghap2008_update082608.pdf [https://perma.cc/C9R6-PEXM].

[112] BAUMANN ET AL., *supra* note 21, at 12.

[113] In the United States, the USGS has divided the country into hydrologic units. U.S. GEOLOGICAL SURVEY, HYDROLOGIC UNIT MAPS 3–5 (1994) [hereinafter HYDROLOGIC UNIT MAPS], https://pubs.usgs.gov/wsp/wsp2294/pdf/wsp_2294.pdf [https://perma.cc/5X57-Q42G]. Hydrologic units represent drainage areas. *Id.*; *Hydrologic Unit Maps*, U.S. GEOLOGICAL SURVEY (Jan. 27, 2017) https://water.usgs.gov/GIS/huc.html [https://perma.cc/UP3M-HT5R]. Each hydrologic unit is identified by a code consisting of 2 to 12 digits. *Hydrologic Unit Maps*, *supra*. In total, the Hydrologic Unit Code ("HUC") system is comprised of 6 levels of drainage areas—HUC 2, 4, 6, 8, 10, and 12. *Id.* Smaller HUCs are nested within the larger HUC areas. *Id.* HUC 2s represent the largest and HUC 12s the smallest drainage areas. *Id.*

("HUC") 10 watersheds, covering approximately eighty percent of the state.[114] Using the monitoring results and other data, the strategy prioritizes reductions in twenty HUC 8 basins in the Mississippi River Basin and nine HUC 8 basins in the Lake Michigan basin;[115] identifies phosphorus yield in pounds per acre per year for each HUC 8 basin in the state;[116] and prioritizes and maps a "'top group' [of] HUC 10 watersheds comprising about [ten] percent of the state's watersheds . . . for the Mississippi River Basin and Lake Michigan Basin."[117] In addition, for each of the top HUC 10 watersheds, the Nutrient Reduction Strategy includes a chart that identifies, *inter alia* the percent agricultural and urban use, the point source- nonpoint source load ratio, and TMDLs.[118]

Figure 2. HUC 8 areas in Wisconsin.[119]

Figure 3. HUC 10 areas in Wisconsin.[120]

Figure 4 (left) Stream Nitrogen Concentrations (median May-October) as measured at the pour points of approximately 354 HUC 10 watersheds. [121]

Figure 5 (right) Stream Phosphorus Concentrations (median May-October) as measured at the pour points of approximately 354 HUC 10 watersheds.[122]

Figure 6. Top HUC 10 Watersheds for Phosphorus.[123]

Figure 7. Top HUC 10 Watersheds for Nitrogen.[124]

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[114] The HUC 10 watersheds used were those delineated in the 1980s and used in the Priority Watershed Priority Lake program. Email from Jim Baumann, Water Quality Eng'r, Wis. Dep't of Nat. Res., to author (Oct. 13, 2016, 20:51 EST) (on file with author) [hereinafter Baumann Oct. 13 Email]. *See generally* HYDROLOGIC UNIT MAPS, *supra* (discussing the development of the HUC system). BAUMANN ET AL., *supra* note 21, at A-2. For the HUC 10s covering the remaining twenty percent of the state, information from similar studies was used or results were extrapolated from similar, nearby HUC 10s. BAUMANN ET AL., *supra* note 21, at 25, 75; Baumann Oct. 13 Email, *supra* note 113.

[115] BAUMANN ET AL., *supra* note 21, at 2.

[116] *Id.* at 7–10.

[117] *Id.* at 3.

[118] *Id.* at A-1–A-4.

[119] Email from Jim Vandenbrook, Exec. Dir., Wis. Land & Water, to author (October 19, 2016, 09:15 CST) (on file with author). Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[120] Email from Jim Baumann, Water Quality Eng'r, Wis. Dep't of Nat. Res., to author (Oct. 18, 2016, 13:21 EST) (on file with author). Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[121] BAUMANN ET AL., *supra* note 21, at 28. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[122] *Id.* at 27. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[123] BAUMANN ET AL., *supra* note 21, at 12. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

2. Integrated Assessment of Watershed Health

In 2011, EPA started the Healthy Watersheds Initiative to encourage the protection of healthy watersheds.[125] In 2014, Wisconsin finalized its Integrated Assessment of Watershed Health ("WHA") pursuant to that Initiative.[126] The report provides a screening-level assessment of reach-scale watershed segments and assesses relative watershed health across the state.[127]

Wisconsin has incorporated, to some extent, the prioritization and assessment results reflected in the NRS and WHA into its approach for addressing waters on its impaired waters list. As Wisconsin continues to move forward with watershed planning and implementation, the state could more fully integrate the prioritization and assessment results into its section 303(d), section 319, and LWRM programming.

The policies highlighted in this section will continue to provide a foundation and framework for watershed planning and implementation in the state. Absent significant rollback through ongoing rulemakings, Wisconsin's numeric water quality standards for phosphorous will provide clear science-based targets for the development of permit limits and watershed plans.[128] Through its 303(d) listing approach, the state can continue to guide choices about the most effective watershed plan types—TMDLs or TMDL-alternatives—and prioritize appropriately TMDL development. The state's NSPS will provide clear standards for urban and agricultural land use BMPs. And, the adaptive management program will provide a framework for watershed planning and implementation by point sources. Additionally, Wisconsin could use the NRS and WHA to develop a statewide plan for addressing nutrient impaired waters through small-scale watershed planning and implementation.

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[124] *Id.* at 13. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[125] CADMUS GRP., WISCONSIN INTEGRATED ASSESSMENT OF WATERSHED HEALTH 4 (2014) [hereinafter ASSESSMENT OF WATERSHED HEALTH], http://dnr.wi.gov/topic/Watersheds/documents/HWA/WiHWreport.pdf [https://perma.cc/PQG5-PU5T] (prepared by an outside group for use by the EPA); U.S. ENVTL. PROT. AGENCY, OFFICE OF WATER, HEALTHY WATERSHEDS INITIATIVE, at v (2011), https://www.epa.gov/sites/production/files/2015-10/documents/hwi_action_plan.pdf [https://perma.cc/4L26-R3HH].

[126] *See id.*

[127] *Id.* at 1, 3, 11, 28. Each reach-scale watershed is approximately 0.4 square miles. *Id.* at 11. On average, dozens of these watersheds exist within each HUC 12. *Id.*

[128] The state is currently drafting three proposed rules, which have the potential to affect the application of the numeric phosphorus standards. *See Proposed Permanent Natural Resources Rules*, WIS. DEP'T OF NAT. RES. (Apr. 25, 2017), http://dnr.wi.gov/news/input/ProposedPermanent.html [https://perma.cc/WEP7-WTFZ] (the proposed rules are listed in the table as WT-17-12, WY-23-13, WY-15-13). In the three pending rule proposals the state is considering, *inter alia,* supplementing its narrative and numeric criteria with biocriteria and amending its water quality criteria. *See id.*

II. AMENDING TMDL, MS4 AND NONPOINT AGRICULTURAL RUNOFF PROGRAMS TO PROMOTE THE NEXT PHASE OF WATERSHED PLAN DEVELOPMENT AND IMPLEMENTATION IN WISCONSIN

Having previously discussed in Part One the policies that provide a foundation and framework for watershed planning and implementation in Wisconsin, this Part will separately discuss and provide recommendations for the TMDL, MS4, and nonpoint agricultural runoff programs.[129] If amended and adequately funded, these programs could provide a bridge to the next phase of watershed planning and implementation in Wisconsin—a phase in which developed plans are implemented and new plans are brought online in currently unaddressed areas. After discussing federal requirements, this Part analyzes Wisconsin's current program approaches and makes recommendations.[130] It concludes by briefly discussing funding and recommending a new funding mechanism for watershed planning and implementation.[131]

A. TMDL Policy: Moving Away from Large-Scale Watershed and Phased TMDLs

Implementation, not just development, of watershed plans is the goal of a watershed policy approach. Effective watershed planning provides a process and mechanism for identifying, prioritizing, implementing and adaptively managing point source control measures and urban and agricultural land use BMPs to restore impaired waterbodies.[132] TMDLs have been called the "technical backbone" of watershed planning.[133] However, limited federal requirements and evolving guidance have not always provided a clear structure for TMDL programming—this is especially true in the case of TMDL implementation.[134] This section discusses TMDL statutory requirements, regulations and EPA guidance; looks at Wisconsin's current large-scale watershed TMDL policy approach as demonstrated by the Lower Fox and Rock River watershed TMDLs; and provides program recommendations.

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[129] *See infra* notes 132–289 and accompanying text.

[130] *See infra* notes 165–289 and accompanying text.

[131] *See infra* notes 290–298 and accompanying text.

[132] GUIDELINES FOR STATES AND TERRITORIES, *supra* note 11, at 18–19.

[133] OLIVER HOUCK, CLEAN WATER ACT TMDL PROGRAM: LAW, POLICY, AND IMPLEMENTATION 57 (2d ed. 2002).

[134] *See supra* note 11 and accompanying text (discussing EPA promulgation and rescission of TMDL regulations with implementation requirement).

1. TMDL Statutes, Regulation, and EPA Guidance

a. CWA Section 303(d) and Implementing Regulations

Section 303(d) of the CWA requires states to identify waters where technology-based effluent limitations in permits are not sufficient to protect water quality and, taking into consideration the pollution severity and designated uses for such waters, establish priority rankings.[135] In its guidance, EPA recommends that states prioritize 303(d) lists through scheduled TMDL completion dates or a ranking system.[136] Regulations also require states to submit their 303(d) lists biennially, specifically identifying waters targeted for TMDL development within the next two years, and to submit, on a timetable agreed upon with a Regional Administrator, TMDLs to EPA for approval.[137] Although the CWA and implementing regulations clearly require the development of TMDLs and submission of the same to EPA, the regulations provide limited guidance regarding the substance of TMDLs.[138] Regulatory requirements state only that TMDLs must be set at a level necessary to protect water quality, taking into account seasonal variations and a margin of safety, and must include wasteload allocations for point sources, load allocations for nonpoint sources, and natural background.[139]

b. Watershed TMDL Guidance

At the outset of the TMDL program, states developed TMDLs for single waterbody segments. This started to change in 1991 when EPA guidance introduced the concept of watershed TMDLs.[140] EPA stated that under a watershed approach, states could bundle and assess multiple impaired waterbody segments within a single watershed.[141] By the early 2000s, states did start to develop these watershed TMDLs, but most TMDLs still only dealt with one im-

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[135] 33 U.S.C. § 1313(d)(1)(A) (2012).

[136] *Id.*; U.S. ENVTL. PROT. AGENCY, OFFICE OF WATER, OFFICE OF WETLANDS, OCEANS & WATERSHEDS, GUIDANCE FOR 2006 ASSESSMENT, LISTING AND REPORTING REQUIREMENTS PURSUANT TO SECTIONS 303(d), 305(b) AND 314 OF THE CLEAN WATER ACT 63 (2005), https://www.epa.gov/sites/production/files/2015-10/documents/2006irg-report.pdf [https://perma.cc/N344-AY2N].

[137] 40 C.F.R. § 130.7(a), (d) (2016).

[138] 33 U.S.C. § 1252(2012); 40 C.F.R. §§ 130.0–130.2 (2016).

[139] 33 U.S.C. § 1313(d)(1)(C); 40 C.F.R. § 130.2(i).

[140] U.S. ENVTL. PROT. AGENCY, OFFICE OF WATER, GUIDANCE FOR QUALITY-BASED DECISIONS: THE TMDL PROCESS 15 (1991) [hereinafter GUIDANCE FOR QUALITY-BASED DECISIONS], https://nepis.epa.gov/Exe/ZyPDF.cgi/00001KIO.PDF?Dockey=00001KIO.PDF [https://perma.cc/KX4A-SQFT].

[141] U.S. ENVTL. PROT. AGENCY, OFFICE OF WATER, OFFICE OF WETLANDS, OCEANS & WATERSHEDS, HANDBOOK FOR DEVELOPING WATERSHED TMDLS (DRAFT) 1 (2008) [hereinafter HANDBOOK FOR DEVELOPING WATERSHED TMDLS], https://www.epa.gov/sites/production/files/2015-10/documents/2009_01_09_tmdl_draft_handbook.pdf [https://perma.cc/ET9P-R3B2].

paired waterbody or impaired segment.[142] Although EPA has addressed scale in general watershed planning and section 319 guidance, the agency did not recommend an appropriate scale in its watershed TMDL guidance.[143] Instead, EPA noted that watershed TMDLs had been developed for areas covering a few square miles and areas covering thousands of square miles, leaving determinations of appropriate scale largely to the discretion of states.[144]

More recent watershed TMDL guidance issued by EPA in 2008 advocates making watershed TMDLs the standard approach.[145] According to EPA, this approach is critical given that demand for TMDL development is increasing as resources are stagnating or declining.[146] EPA cites several purported benefits of watershed TMDLs including, *inter alia*, analyzing interactions between upstream and downstream sources, reducing the overall number of new or "redo" TMDLs, integrating TMDLs with other watershed programs, facilitating watershed-wide planning, providing for more effective implementation, and more easily addressing non-traditional point sources.[147]

c. Phased TMDL Guidance

EPA's 1991 TMDL guidance also introduced phased TMDLs.[148] In that guidance, the agency states that phased TMDLs could be used to start reducing pollution without waiting for additional data collection and analysis.[149] The agency notes two circumstances in which a phased approach would be appropriate—nonpoint source impairment or where there is a lack of data or adequate modeling.[150]

In 2006, EPA curtailed its support for phased TMDLs, in part out of a concern that this approach had been misconstrued as supporting the development of TMDLs that will not meet water quality standards.[151] The agency, in a clarifying memorandum, stated that phased TMDLs must be developed to meet

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[142] *Id.* at 2.

[143] U.S. ENVTL. PROT. AGENCY, HANDBOOK FOR DEVELOPING WATERSHED PLANS TO RESTORE AND PROTECT OUR WATERS 61 (2008), https://www.epa.gov/sites/production/files/2015-09/documents/2008_04_18_nps_watershed_handbook_handbook-2.pdf [https://perma.cc/2BJX-SL96] (showing a table of watershed models commonly used in TMDL development); GUIDELINES FOR STATES AND TERRITORIES, *supra* note 11, at 11–12.

[144] HANDBOOK FOR DEVELOPING WATERSHED TMDLS, *supra* note 141, at 23.

[145] *Id.* at 3–4.

[146] *Id.* at 3.

[147] *Id.* at 11–12.

[148] GUIDANCE FOR QUALITY-BASED DECISIONS, *supra* note 140, at 22.

[149] *Id.*

[150] *Id.* at 2, 20.

[151] Memorandum from Benita Best-Wong, Dir., Assessment & Watershed Prot. Div., Envtl. Prot. Agency to Water Div. Dirs., Regions I–X, Envtl. Prot. Agency, at 1 (Aug. 2, 2006) [hereinafter 2006 Clarifying Memorandum], https://www.epa.gov/sites/production/files/2015-10/documents/2006_08_08_tmdl_tmdl_clarification_letter.pdf [https://perma.cc/DB3P-WWM8].

applicable water quality standards and narrowed the circumstances in which phased TMDLs are appropriate.[152] EPA noted that the usual need to update TMDLs as additional data is collected is distinct from the paucity of data demanding a phased approach.[153] The agency also recommended limiting phased TMDLs to cases where scheduling demands development despite data uncertainty and where allocations will be revised in the near future with the collection of additional information.[154] In addition, the guidance cautions states to carefully consider whether to utilize a phased TMDL because required revisions generally result in greater overall effort.[155]

d. 2013 Revised Vision for the TMDL Program

In 2013, EPA developed a new ten year vision for the TMDL program.[156] EPA's vision document lists six goals one of which, perhaps somewhat counter intuitively, is the use of TMDL-alternatives.[157] In a later memorandum, EPA describes TMDL-alternatives as plans with schedules and milestones that will produce more immediate benefit or more effectively achieve water quality standards.[158] The agency encourages TMDL-alternative restoration plans, where such plans could better address priority watersheds or achieve nonpoint source load reductions.[159] By supporting TMDL-alternatives, EPA also notes that it aims to better understand how adaptive management can be used to achieve water quality goals.[160]

EPA does not discuss the substance of TMDL-alternative watershed plans in its new vision document; however, in its 2013 section 319 nonpoint guidance, EPA suggests the use of nine key element watershed plans as TMDL-alternatives.[161] In contrast to the rather limited building blocks required for a TMDL, nine key element plans must include: (1) causes of impairment and pollutant sources, identified at the subcategory level with contribution estimates; (2) management measure load reduction estimates; (3) needed nonpoint source management measures and critical implementation areas; (4) technical

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[152] *Id.* at 3–5.
[153] *Id.* at 3.
[154] *Id.*
[155] *Id.*
[156] LONG-TERM VISION, *supra* note 12, at 2.
[157] *Id.* at 5–11.
[158] *See* Memorandum from Benita Best-Wong, Dir., Office of Wetlands, Oceans, & Watersheds, Envtl. Prot. Agency to Water Div. Dirs., Regions I–X Envtl. Prot. Agency & Robert Maxfield, Dir., Office of Envtl. Mgmt. & Evaluation, Envtl. Prot. Agency, at 4 (Aug. 13, 2015), https://www.epa.gov/sites/production/files/2015-10/documents/2016-ir-memo-and-cover-memo-8_13_2015.pdf [https://perma.cc/J8GC-DSVY].
[159] LONG-TERM VISION, *supra* note 12, at 9.
[160] *Id.*
[161] GUIDELINES FOR STATES AND TERRITORIES, *supra* note 11, at 11, 20.

and financial assistance and cost estimates and/or the sources and authorities that will be relied on; (5) an information and education component; (6) reasonably expeditious nonpoint source management measure implementation schedule; (7) interim milestones for measuring management measures or other control action implementation; (8) criteria for determining loading reduction and water quality standard attainment progress; and (9) a monitoring component to evaluate the effectiveness of the implementation efforts over time.[162] EPA also notes that while TMDLs can be developed at varying watershed scales, nine key element watershed plans often target HUC 12 watersheds.[163] Moreover, the agency states that whether a state utilizes a TMDL or a TMDL-alternative, it should strive to ensure that a proper balance exists between development and implementation so that plans do not "become outdated before they are implemented."[164]

2. Wisconsin's Large-Scale Watershed TMDL Approach: Rock River and Lower Fox River examples

Since 2011, Wisconsin has placed significantly greater emphasis on the development of large-scale watershed TMDLs than on the development and implementation of smaller scale watershed TMDLs or TMDL-alternatives. The Rock River and Lower Fox River TMDLs finalized in 2011 and 2012 are two examples of Wisconsin's large-scale watershed TMDLs.[165] The Rock River TMDL covers 3,750 square miles and addresses sixty-two impaired waterbody segments; the Lower Fox River TMDL covers 641 square miles and addresses twenty-seven impaired waterbody segments.[166] Both of the EPA-approved TMDLs cover a substantial number of small scale, HUC 12, drainage areas.

Figure 8. Lower Fox River[167] and Rock River TMDL areas.

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[162] *Id.* at 63.

[163] *Id.* at 11.

[164] *Id.* at 20.

[165] *See* CADMUS GRP., TOTAL MAXIMUM DAILY LOAD AND WATERSHED MANAGEMENT PLAN FOR TOTAL PHOSPHORUS AND TOTAL SUSPENDED SOLIDS IN THE LOWER FOX RIVER BASIN AND LOWER GREEN BAY (2012) [hereinafter LOWER FOX AND LOWER GREEN BAY TMDL], http://dnr.wi.gov/topic/TMDLs/documents/lowerfox/LowerFoxRiverTMDLReport2012.pdf [https://perma.cc/877D-JZPC] (prepared by an outside group for use by the Wisconsin Department of Natural Resources, Oneida Tribe of Indians of Wisconsin, and EPA); CADMUS GRP., TOTAL MAXIMUM DAILY LOADS FOR TOTAL PHOSPHORUS AND TOTAL SUSPENDED SOLIDS IN THE ROCK RIVER BASIN (2011) [hereinafter ROCK RIVER TMDL], http://dnr.wi.gov/topic/tmdls/rockriver/ [https://perma.cc/5F6A-XABE] (to access a PDF of the TMDL report, follow the link to the website and select "Rock River TMDL Report") (prepared by an outside group for use by the Wisconsin Department of Natural Resources and EPA).

[166] LOWER FOX AND LOWER GREEN BAY TMDL, *supra* note 165, at 3–4; ROCK RIVER TMDL, *supra* note 165**,** at 2, 5–10.

[167] LOWER FOX AND LOWER GREEN BAY TMDL, *supra* note 165, at 5. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/lawreview-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

Figure 9: HUC 12 areas in the Lower Fox River Watershed.[168]

Figure 10: HUC 12 areas in the Upper Rock and Lower Rock River watersheds.[169]

Despite the significant effort that went into developing the large-scale Rock River TMDL, the degree to which the plan has aided BMP identification and deployment is unclear. Stakeholders located in the watershed have developed and begun to implement smaller scale watershed planning projects.[170] However, an examination of stakeholder plan development processes suggests that the state's large-scale TMDL did not facilitate the smaller scale planning that is actually leading to BMP implementation. For example, the City of Oconomowoc challenged its TMDL allocations before proceeding to develop an adaptive management plan.[171] Moreover, before developing its smaller scale plan, Madison Metropolitan Sewerage District entered into a memorandum of understanding with the state to clarify that the POTW would only develop a plan using revised allocation numbers.[172] In both cases, the stakeholders conducted independent inventories, remodeled baselines, and refined load reduction figures before proceeding to develop and implement their plans.[173] The limited utility of the TMDL for facilitating implementation may be in part due to the use of limited land management data and assumed values for POTW discharges in large-scale TMDL modeling.[174]

Application of the phased approach to the Lower Fox River large-scale watershed TMDL may have added another layer of abstraction and further un-

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[168] *Geospatial Data Gateway*, U.S. DEP'T OF AGRIC., NAT. RES. CONSERVATION SERV., https://gdg.sc.egov.usda.gov/GDGOrder.aspx?order=QuickState [https://perma.cc/4M7H-TBW7] (to generate a copy of this map, select "Wisconsin," and under Hydrologic Units, select "12 Digit Watershed Boundary Dataset," and then select "Lower Fox"). Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[169] *Geospatial Data Gateway*, *supra* note 168 (to generate a copy of this map select "Wisconsin," and under Hydrologic Units, select "12 Digit Watershed Boundary Dataset," and then select "Upper Rock" and "Lower Rock"). Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[170] *See supra* notes 299–306 and accompanying text.

[171] Telephone Interview with Tom Steinbach, City of Oconomowoc Wastewater Operations Manager (Jun. 20, 2016) [hereinafter Steinbach Phone Interview].

[172] *See infra* notes 323–366 and accompanying text (providing a case study of the Madison Metropolitan Sewerage District ("MSD") Adaptive Management Plan).

[173] *See infra* notes 323–366 (providing a case study of the Madison Metropolitan Sewerage District Adaptive Management plan), 367–392 (providing a case study of the City of Oconomowoc Adaptive Management Plan) and accompanying text.

[174] *See* ROCK RIVER TMDL, *supra* note 165, at 26; *see also* LOWER FOX AND LOWER GREEN BAY TMDL, *supra* note 165, app. B 108–112. The Rock River TMDL does not include a similar description of model inputs for agricultural and urban land use areas. ROCK RIVER TMDL, *supra* note 165, at 26. However, similar challenges with baseline loading numbers for the Rock River TMDL are discussed in the Madison MSD planning documents. *See infra notes* 323–367 and accompanying text.

dermined its utility for implementation.[175] Although the Lower Fox River TMDL only addresses sources within the Lower Fox River Basin, as shown by the graphics below, the Upper Fox and Wolf River Basins and Lake Winnebago, together with the Lower Fox River Basin, make up one watershed, the Fox-Wolf River Basin.[176] To account for potential loading from the upper Fox and Wolf River Basins and Lake Winnebago, the TMDL establishes a forty percent reduction goal for pollutant loads entering the Lower Fox River Basin from Lake Winnebago.[177] The TMDL notes that the goal may need to be revised if the TMDLs for the Upper Fox and Wolf River Basins demonstrate the infeasibility of a forty percent reduction.[178]

Figure 11: Drainage Basins in the Fox River watershed and percent land area in each of the Drainage Basins.[179]

The phased approach leaves the state and stakeholders with allocations under the current TMDL in a precarious situation. Stakeholders could develop compliance strategies only to have to revise those strategies should the allocations change after the next phase of the TMDL is completed. Moreover, if the state is forced to adjust the allocation attributed to upstream sources in the future, it will likely have to remodel pollutant loading in the Lower Fox River Basin, revise the allocations for in-basin sources, and resubmit the plan to EPA for re-approval—a process that would be both costly and inefficient.[180]

Despite challenges incorporating land management and point source data in the large-scale Rock River and Lower Fox River watershed TMDLs, and the potentially limited utility of the TMDLs for facilitating control measure implementation, in the near term, Wisconsin plans to continue to prioritize the devel-

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[175] *See* LOWER FOX AND LOWER GREEN BAY TMDL, *supra* note 165, at 31. A phased approach to large-scale watershed plan development, like that taken in the Lower Fox River watershed TMDL, is distinguishable from this article's recommended approach of aggregating small-scale HUC 12 watershed plans to achieve necessary reductions for larger watersheds. *See id.* Under the recommended approach, small-scale plans developed with granular inventory information enable more accurate determination of baseline loading, better engagement of local stakeholders, and identification of practicable loading reductions that can be achieved through prioritized BMP implementation. *See supra* note 128 and accompanying text (offering recommendations for small-scale watershed planning). Together, these factors may substantially increase the likelihood of plan implementation. *See supra* note 128 and accompanying text. Under a large-scale phased TMDL approach, the scale of the TMDLs developed at each phase may limit planners' ability to collect sufficiently granular land management inventory data, make accurate baseline loading determinations, work with local stakeholders, and identify and prioritize BMPs. Absent these elements, large-scale phased TMDLs may be significantly less likely to lead to implementation. *See* LOWER FOX AND LOWER GREEN BAY TMDL, *supra* note 165, at 31.

[176] LOWER FOX AND LOWER GREEN BAY TMDL, *supra* note 165, at 31.

[177] *Id.* at 37.

[178] *Id.*

[179] *Id.* at 31. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL]

[180] *See* 2006 Clarifying Memorandum, *supra* note 151.

opment of large-scale watershed TMDLs, and to develop even larger-scale watershed TMDLs in the Wisconsin, Upper Fox and Wolf River Basins.[181] The pending 9156 square mile—5,859,840 acre—Wisconsin River TMDL covers approximately fifteen percent of the state and will be Wisconsin's largest watershed TMDL to date.[182] The Wisconsin River TMDL is approximately 2.5 times as large as the Rock River TMDL and almost six times as large as the Lower Fox River TMDL.[183] After completing these pending large-scale watershed TMDLs, Wisconsin plans to address "level 2" priority areas.[184] Wisconsin's planning documents, though, leave unclear if, when, and where the state will use smaller scale HUC-12 TMDLs or TMDL-alternatives.[185]

Figure 13 (right) Wisconsin River Watershed.[186]

Figure 14 (left) Level 1 and 2 Water Quality Restoration Priority Areas.[187]

3. Recommendations for Wisconsin's 303 (d) Programming: HUC 12 Scale Planning and Implementation and Model Plan Guidance

Determining the appropriate scale of a watershed plan is critical. As one state environmental agency has noted, scale affects stakeholder participation, data development, inventories, management and, ultimately, the success or

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[181] WIS. DEP'T OF NAT. RES., DIV. OF ENVTL. MGMT., WISCONSIN'S 2016 WATER QUALITY REPORT TO CONGRESS: INTEGRATED REPORT OF WATER QUALITY—EXECUTIVE SUMMARY 16–17 (2016) [hereinafter WATER QUALITY EXECUTIVE SUMMARY], http://dnr.wi.gov/topic/surfacewater/ir2016.html [https://perma.cc/37Q4-3VH9] (to access a PDF copy of the report navigate to the webpage and hit the blue button that says "Read").

[182] *Id.*

[183] *See* LOWER FOX RIVER TMDL, *supra* note 165, at 7 (covering 641 square miles or 410,240 acres); ROCK RIVER TMDL, *supra* note 165, at 10 (covering 3750 square miles or 2.4 million acres).

[184] WIS. DEP'T OF NAT. RES., WATER QUALITY & WATERSHED MGMT. BUREAUS, WISCONSIN'S WATER QUALITY RESTORATION AND PROTECTION PRIORITIZATION FRAMEWORK 6 (2016) [hereinafter RESTORATION AND PROTECTION PRIORITIZATION FRAMEWORK] (published as Appendix A to WIS. DEP'T OF NAT. RES., WATER QUALITY BUREAU, DIV. OF ENVTL. MGMT., WISCONSIN'S WATER QUALITY REPORT TO CONGRESS 2016, at 95, http://dnr.wi.gov/topic/surfacewater/assessments.html [https://perma.cc/75SF-7LDT] (to access this report navigate to the webpage and select the tab for "2016 Integrated Report," and then select the link to "Clean Water Act Integrated Report for 2016")).

[185] RESTORATION AND PROTECTION PRIORITIZATION FRAMEWORK, *supra* note 184, at 6; *see* WATER QUALITY EXECUTIVE SUMMARY, *supra* note 181, at 2–3.

[186] *See* ADAM FREIHOFER, WIS. DEP'T OF NAT. RESOURCES, WISCONSIN RIVER BASIN TMDL STUDY AREA (2013), http://dnr.wi.gov/topic/TMDLs/documents/WisconsinRiver/WRB_Basemap_8.5_11.pdf [https://perma.cc/JD8E-CYHP]. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[187] RESTORATION AND PROTECTION PRIORITIZATION FRAMEWORK, *supra* note 184, at 11. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

failure of a watershed plan.[188] With its large-scale watershed TMDL approach, Wisconsin might complete several more paper TMDLs, but fail to substantially aid in the development of implementation plans, the deployment of land use BMPs or the restoration of water quality.[189]

At best, large-scale watershed TMDLs help to provide a big picture or framework for targeting more localized implementation plans. At worst, large-scale watershed TMDLs may result in informational plans that sit on shelves and do little to further control measure implementation and improve water quality. In Wisconsin in particular, the development, in the near-term, of additional large-scale plans may be unnecessary. The state's Nutrient Reduction Strategy, Integrated Assessment of Watershed Health, and regional water quality management plans may already provide sufficient big picture context for proceeding with the development of smaller scale plans that could more effectively facilitate BMP implementation and improve water quality.[190]

This article recommends that Wisconsin increase its focus on the development and implementation of HUC 12 nine key element watershed plans in its 303(d) program. Wisconsin's HUC 12 watersheds are shown in **Figure** 12. Suspending large-scale TMDL development and shifting focus to nine key element HUC 12 plans could facilitate increased BMP deployment and water quality improvements. Alternatively, Wisconsin might consider enhancing the existing TMDL approach to clarify when, where and how smaller scale implementation plans will be used.

Figure 12 HUC 12 watershed areas in Wisconsin.[191]

To support use of nine key element plans, Wisconsin could consider issuing guidance highlighting model plans. A review of completed nine key ele-

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[188] MICH. DEP'T OF ENVTL. QUALITY, SCALE CONSIDERATIONS IN THE DEVELOPMENT OF A NINE-ELEMENT MANAGEMENT PLAN 1 (2013), https://www.michigan.gov/documents/deq/wrd-nps-scale_456936_7.pdf [https://perma.cc/7XQJ-BGNS]; *see* M. D. Tomer et al., *Agricultural Conservation Planning Framework: 1. Developing Multipractice Watershed Planning Scenarios and Assessing Nutrient Reduction Potential*, 44 J. OF ENVTL. QUALITY 754, 754 (2015) (Recommending a HUC 12 scale planning approach, and noting that "Although these problems are continental in scope, the challenge in addressing them lies in the management of thousands of small agricultural watersheds and millions of individual farm fields across the Midwest.").

[189] *See* NONPOINT SOURCE PROGRAM MANAGEMENT PLAN, *supra* note 74, at 49 ("Wisconsin's TMDL implementation planning process is still in its infancy.").

[190] *See, e.g.,* SE. WIS. REG'L PLANNING COMM'N, A REGIONAL WATER QUALITY PLAN UPDATE FOR THE GREATER MILWAUKEE WATERSHEDS 11, 21 (2013) [hereinafter MILWAUKEE WATERSHED WATER QUALITY PLAN], http://www.sewrpc.org/SEWRPCFiles/Publications/pr/pr-050_part-1_water_quality_plan_for_greater_mke_watersheds.pdf [https://perma.cc/KME5-2MRW]. *See generally* BAUMANN ET AL., *supra* note 21; ASSESSMENT OF WATERSHED HEALTH, *supra* note 146. RESTORATION AND PROTECTION PRIORITIZATION FRAMEWORK, *supra* note 184, at 4–5, 39–52.

[191] Image provided by Bryan Hartsook, Water Res. Eng'r, Wis. Dep't of Nat. Res. Illustrative images can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

ment plans for Wisconsin reveals significant variation.[192] For instance, Brown, Calumet, and Outagamie LWCDs have successfully utilized nine key element planning to develop HUC 12 scale watershed plans for agricultural areas.[193] In contrast to these smaller scale plans, which incorporate clear implementation roadmaps, other nine key element plans have been executed at larger scales, with limited data, and without BMP recommendations.[194] These larger plans, though, are unlikely to effectively catalyze BMP implementation. Wisconsin could consider highlighting the exemplar plans discussed in Part Three, to promote the consistent development of nine key element plans at the scale most likely to facilitate BMP implementation and improve water quality

There are several potential benefits to increasing emphasis on smaller scale planning. First, Wisconsin's past experience and success implementing smaller scale watershed plans under the PWPL and EAP programs provides a strong foundation, and the state's NSPS could be used to further strengthen and streamline such an approach. Second, a smaller scale nine key element approach would align the state's TMDL program with the alternatives element of EPA's new 303(d) vision and revised progress measures. Third, many of the purported benefits that EPA associates with watershed TMDLs and TMDL-alternatives—reducing new or "redo" TMDLs, providing a framework for more effective implementation, more easily addressing nonpoint and non-traditional point sources—may be more effectively realized through the use of smaller scale watershed plans that incorporate more specific land management and other inventory data and provide BMP implementation roadmaps.[195]

In addition, smaller scale plans may support more equitable and economically efficient allocations, or load shifting, between point and nonpoint sources. CWA regulations permit "tradeoffs" between point and nonpoint sources, if practicable, to achieve necessary loading reductions.[196] In determining what is practicable, EPA guidance states that increasing wasteload allocations for point sources is only permissible if the state provides "reasonable assurances" that nonpoint load allocations will be achieved.[197] As public pressure to restore nutrient impaired waters continues to build, EPA regions may begin to look more closely at purported reasonable assurances for nonpoint reductions in watershed planning documents. Under a heightened review, smaller scale nine key element plans, which include specific nonpoint implementation

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[192] *See supra* notes 299–322 and accompanying text (discussing 9 key element plans).

[193] *See supra* notes 299–302 and accompanying text (discussing 9 key element plans).

[194] *See supra* notes 306–322 and accompanying text (discussing 9 key element plans).

[195] *See supra* notes 167, 180 and accompanying text.

[196] 40 C.F.R. § 130.2(i) (2016); Memorandum from Robert Perciasepe, *supra* note 1, at 1; *see* GUIDANCE FOR QUALITY-BASED DECISIONS, *supra* note 140, at 15.

[197] *Id*.

actions, may better support load shifting. Without compromising environmental integrity, load shifting can entail significant economic benefit.

B. MS4 Policy: Better Integrating MS4s into Watershed Planning

MS4 permittees are important stakeholders in the watershed planning process and MS4 permits are key implementation mechanisms for the successful restoration of nutrient impaired waterbodies. Unfortunately, as with TMDL programming, limited and evolving federal requirements and guidance have not always provided clear and consistent instruction to states. Specifically, federal MS4 guidance does not clearly guide states' implementation and enforcement of WQBELs and associated permit requirements or clearly identify how states can increase MS4 participation in the development and implementation of watershed plans. This subsection discusses federal MS4 requirements and guidance; reviews Wisconsin's current MS4 policy approach as demonstrated by its general permit requirements and MS4 TMDL guidance; and recommends program changes.

1. MS4 Statute, Regulations, and EPA Guidance

a. The MEP Permit Standard

The CWA provides that MS4 permits must include requirements for controls that reduce the discharge of pollutants to the "maximum extent practicable" ("MEP").[198] This standard is the default standard for MS4s—the standard with which MS4s must comply unless a WQBEL is included in their permit.[199] MEP regulations distinguish between small, medium, and large MS4s.[200] All MS4s are required to implement stormwater management programs ("SWMPs") to reduce the discharge of pollutants to the MEP.[201] Small MS4s can comply with the MEP standard by obtaining and complying with a general permit requiring implementation of a SWMP that meets six minimum measures: (1) public education and outreach; (2) public involvement/ participation; (3) illicit discharge detection and elimination; (4) construction site stormwater runoff; (5) post-construction stormwater management in new development and redevelopment; and (6) pollution prevention/good housekeeping for municipal operations.[202] Large and medium MS4s must obtain an individual permit that includes additional requirements and requires more detailed

[198] 33 U.S.C. § 1342(p)(3)(B)(iii) (2012).
[199] 40 C.F.R. §§ 122.26(3), 122.32(a) (2016).
[200] *See id.* §§ 122.26(d)(2), 122.34(a).
[201] *Id.* §§ 122.34(a) (applicable to small MS4s), 122.26(d)(2)(iv) (applicable to medium and large MS4s).
[202] *Id.* § 122.34(a), (b).

SWMP planning.[203] Although small MS4s also have the option of obtaining an individual permit, approximately ninety-four percent of small MS4s in the United States, are covered under general permits.[204] EPA has issued thorough and clear guidance, including model provisions, to help MS4s achieve compliance with the MEP standard through implementation of the six minimum measures and similar requirements for large and medium MS4s.[205]

b. Water Quality Based Effluent Limits

As previously discussed, the CWA may also require that permits include WQBELs to meet water quality standards.[206] A WQBEL must be included in a permit if a permitting authority determines that "pollutants . . . are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard."[207] A TMDL is not a prerequisite for a permit WQBEL, but regulations require that a WQBEL be consistent with a TMDL, if a TMDL has been approved.[208]

i. Early WQBEL Guidance

Unlike the MEP regulations, WQBEL regulations do not distinguish between large, medium, and, small MS4s.[209] Moreover, EPA has consistently espoused a single, though evolving, policy approach for incorporating WQBELs

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[203] *Id.* § 122.26(d)(2)(iv).

[204] *Id.* § 122.34(a); National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System General Permit Remand, 81 Fed. Reg. 415, 418 (Jan. 6, 2016) [hereinafter MS4 General Permit Remand Proposed Rule] (to be codified at 40 C.F.R. pt. 122).

[205] *See, e.g.*, U.S. ENVTL. PROT. AGENCY, OFFICE OF WATER, OFFICE OF WASTEWATER MGMT., WATER PERMITS DIV., MS4 PERMIT IMPROVEMENT GUIDE 1–2 (2010), https://www3.epa.gov/npdes/pubs/ms4permit_improvement_guide.pdf [https://perma.cc/8WFS-CA6Z] (providing examples of MS4 permit strategies to guide municipalities in crafting their permit applications); U.S. ENVTL. PROT. AGENCY, OFFICE OF WATER, WATER PERMITS DIV., POST-CONSTRUCTION PERFORMANCE STANDARDS & WATER QUALITY-BASED REQUIREMENTS: A COMPENDIUM OF PERMITTING APPROACHES 2 (2014), https://www3.epa.gov/npdes/pubs/sw_ms4_compendium.pdf [https://perma.cc/Y7WS-DRUW] (providing examples of successful MS4 permit strategies).

[206] 33 U.S.C. § 1312(a) (2012).

[207] 40 C.F.R. § 122.44 (d)(i), (iii) National Pollutant Discharge Elimination System—Regulations for Revision of the Water Pollution Control Program Addressing Stormwater Discharges, 64 Fed. Reg. 68,722, 68,790 (Dec. 8, 1999) [hereinafter Regulations for Stormwater Discharges] (to be codified at 40 C.F.R. pts. 9, 122, 123, and 124) ("This so-called 'reasonable potential' analysis is intended to determine whether and for what pollutants water quality based effluent limits are required. The analysis is, in effect, a substitute for a similar determination that would be made as part of a TMDL, where necessary.").

[208] *Id.* § 122.44 (d)(vii)(B).

[209] *See* 40 C.F.R. § 122.44(d).

into MS4 permits.[210] EPA's early guidance recommended the use of narrative standards, as opposed to numeric WQBELs in MS4 permits.[211] EPA explained its initial support for narrative standards by stating that the available methodologies for deriving numeric WQBELs were not well-suited to stormwater discharges with highly variable flow and pollutant concentrations; however, the agency qualified its general statement in three ways.[212] First, EPA put a time limit on the statement, noting that the approach would be relevant only for the first two to three MS4 permit cycles.[213] Second, the agency noted that more specific limits, which could include BMPs, performance standards, monitoring requirements, or action levels should be included, if feasible.[214] And third, as permitting authorities and permittees gained experience with stormwater management, EPA called for the continual integration of clearer and more specific permit terms.[215]

In its early WQBEL guidance, EPA also discussed the need for monitoring to identify problems in receiving waters and effluent discharges and to assess the effectiveness of stormwater controls.[216] EPA noted that a permittee may utilize ambient monitoring, discharge monitoring, or a combination of approaches and that chemical, biological, whole effluent, or other monitoring tools may be appropriate.[217] To help address costs of monitoring programs, the agency recommended that entities conduct coordinated watershed monitoring programs. [218]

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[210] Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits, 61 Fed. Reg. 43,761, 43,761 (Aug. 26, 1996) [hereinafter Interim Permitting Approach] (providing notice of a proposed policy statement).

[211] Questions and Answers Regarding Implementation of an Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits, 61 Fed. Reg. 57,425, 57,427 (Nov. 6, 1996) [hereinafter Questions and Answers] (providing notice of an interim permitting approach). Numeric WQBELs have traditionally been used in POTW and industrial wastewater permits. Generally, WQBELs take the form of end-of-pipe limits based on the mass and concentration of a pollutant in an effluent stream. *See* U.S. ENVTL. PROT. AGENCY, NPDES PERMIT WRITERS' MANUAL 6–16 (2010), https://www3.epa.gov/npdes/pubs/pwm_2010.pdf [https://perma.cc/6FEH-DK5M].

[212] Questions and Answers, *supra* note 211, at 57,427 (providing notice of an interim permitting approach); *see* Regulations for Stormwater Discharges, *supra* note 208, at 68,753.

[213] Regulations for Stormwater Discharges, *supra* note 208, at 68,753, 68,788.

[214] Questions and Answers, *supra* note 211, at 57,427.

[215] *Id.*

[216] *Id.* at 57,426.

[217] *Id.* at 57,428.

[218] Interim Permitting Approach, *supra* note 210, at 43,761; Questions and Answers, *supra* note 211, at 57,428.

ii. Recent MS4 WQBEL Guidance

In 2014, after most states had issued two or three rounds of MS4 permits, EPA updated its MS4 WQBEL guidance.[219] In its updated guidance the agency discussed numeric WQBELs, WQBEL implementation timelines, and monitoring.[220] This guidance recommended a shift from narrative standards to "clear, specific, and measurable" numeric WQBELs and clarified that numeric limits in MS4 permits need not be narrowly confined to the traditional end-of-pipe limits used in POTW and industrial wastewater permits.[221] Rather, according to the agency, numeric limits for MS4s refer to permit requirements with a "quantifiable or measurable parameter related to a pollutant" such as onsite stormwater retention volumes and percentages or amounts of impervious cover.[222] Regarding WQBEL implementation timelines, the agency restated the regulatory requirement that compliance schedules achieve compliance "as soon as possible" and advised permitting authorities to consider coordinating MS4 WQBEL implementation timelines with TMDL implementation plans and other comprehensive watershed plans.[223] The guidance also restated the regulatory monitoring requirement.[224]

c. Revised Small MS4 Rule

In January 2016, EPA proposed a revised small MS4 rule.[225] The agency did so in response to a Ninth Circuit ruling finding that EPA's small MS4 rule failed to provide for sufficient public notice and comment opportunity and agency review of BMPs selected to meet CWA requirements.[226] In the pream-

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[219] Memorandum from Andrew Sawyers, Dir., Office of Wastewater Mgmt., & Benita Best-Wong, Dir., Office of Wetlands, Oceans, & Watersheds, to Water Div. Dirs, Regions 1–10, at 1 (Nov. 26, 2014) [hereinafter Revisions Memorandum], https://www3.epa.gov/npdes/pubs/EPA_SW_TMDL_Memo.pdf [https://perma.cc/DJP8-2F4P].

[220] *See id.* at 3–9.

[221] *Id.* at 4.

[222] *Id.* at 2, 4 n.5.

[223] 40 C.F.R. § 122.47(a)(1) (2016) (setting a timeline for compliance); *see* Revisions Memorandum, *supra* note 219, at 6–7 (explaining how the two mechanisms can be used to compliment one another). The guidance states:

> Where a TMDL has been established and there is an accompanying implementation plan that provides a schedule for an MS4 to implement the TMDL, or where a comprehensive, integrated plan addressing a municipal government's wastewater and stormwater obligations under the NPDES program has been developed, the permitting authority should consider such schedules as it decides whether and how to establish enforceable interim requirements and interim dates in the permit.

Revisions Memorandum, *supra* note 219, at 6–7.

[224] Revisions Memorandum, *supra* note 219, at 6–7.

[225] MS4 General Permit Remand Proposed Rule, *supra* note 204, at 415.

[226] Envtl. Defense Ctr., Inc. v. Envtl. Prot. Agency, 344 F.3d 832, 853, 879 (9th Cir. 2003); U.S. ENVTL. PROT. AGENCY, FINAL MS4 GENERAL REMAND RULE—FACT SHEET 2 (2016) [hereinafter

ble to the proposed rule, EPA rejected MS4 permitting approaches that use indefinite language that makes required actions uncertain, language that gives too much authority to the permittee, and "'caveat' language . . . ."[227] The agency also expressed disapproval of permit provisions that require the development of plans without clearly stating required plan contents.[228] The agency explained that unclear planning requirements are problematic because they leave planning actions up to the discretion of the permittee and create a situation in which insubstantial actions could be considered sufficient for compliance.[229] On November 17, 2016, EPA finalized the revised small MS4 rule.[230] The final rule identifies three approaches to MS4 permitting that states can take to address the above concerns.[231]

2. Wisconsin's MS4 WQBEL Policies

Wisconsin's general permit and MS4 guidance do not clearly identify an approach for determining numeric WQBELs for MS4s, thereby potentially providing substantial discretion to permittees. For example, the general permit provides that to address TMDL allocations, MS4s should submit "recommendations and options for stormwater control measures."[232] Additionally, the state's guidance provides that MS4 permittees will have substantial authority to develop their own benchmarks and further notes that reductions need only be "*comparable* to the MS4's TMDL [wasteload allocations]."[233]

FINAL RULE FACT SHEET]; *see* MS4 General Permit Remand, *supra* note 204, at 415. The court stated that because the Notices of Intent ("NOI") contained proposed BMPs for permit compliance and did not contain just general information the NOI documents were "functionally equivalent" to individual permit applications. *Envtl. Defense Ctr., Inc.*, 344 F.3d at 853, 879. As such, they needed to undergo the same public comment and permit authority review processes. *Id.* On remand, the Ninth Circuit ordered EPA to address these procedural deficiencies in the small MS4 rule. *Id*.

[227] MS4 General Permit Remand Proposed Rule, *supra* note 204, at 415.

[228] *Id.* at 423.

[229] *Id.*

[230] National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System General Permit Remand Rule, 81 Fed. Reg. 89,320, 89321 (Dec. 9, 2016) [hereinafter MS4 General Permit Remand Final Rule] (to be codified at 40 C.F.R. pt. 122); FINAL RULE FACT SHEET, *supra* note 226, at 2.

[231] MS4 General Permit Remand Final Rule, *supra* note 230, at 89,324; FINAL RULE FACT SHEET, *supra* note 226, at 2.

[232] WIS. DEP'T OF NAT. RES., GENERAL PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM, WPDES PERMIT NO. WI-S050075-2, at 7 (2014) [hereinafter MS4 PERMIT], http://dnr.wi.gov/topic/StormWater/documents/WPDES-WI-S050075-2.pdf [https://perma.cc/E63A-V24N].

[233] TMDL GUIDANCE FOR MS4 PERMITS, *supra* note 94, at 8 (emphasis added); *see id.* ("[Department of Natural Resources] may elect to place specific benchmarks in an MS4 permit. However, it is expected that MS4 permittees will have the primary role in establishing their own benchmarks for each five year permit term.").

The state's approach to WQBEL compliance schedules is similarly vague. The general permit requires MS4s to complete an updated stormwater map within two years of TMDL completion or permit issuance (if the TMDL was completed prior to permit issuance) and to complete a load assessment and, if necessary, a written plan for achieving needed load reductions within four years of TMDL completion or permit issuance (if the TMDL was completed prior to permit issuance).[234] However, the general permit does not provide a similarly clear timeline for implementing planned BMPs and achieving WQBEL compliance. Instead of clarifying the state's compliance schedule policy, MS4 guidance provides that permittees will not likely receive a BMP implementation schedule until their second or third permit term after TMDL approval.[235] Moreover, where substantial reductions are necessary, the guidance also notes that compliance schedules can be implemented over several permit cycles.[236]

The state's approach to MS4 compliance schedules contrasts with its approach in the POTW context. There, Wisconsin has incorporated a standardized WQBEL compliance schedule into POTW permits.[237] Moreover, the state has also developed the adaptive management WQBEL compliance option for POTWs, which incorporates a defined implementation timeline and interim numeric effluent limits.[238]

Wisconsin also provides very little information regarding MS4 WQBEL monitoring requirements. The state's general permit does not include interim or final monitoring requirements for determining WQBEL implementation progress or compliance.[239] Instead of clarifying affirmative monitoring requirements, guidance suggests that MS4s will not be required to conduct ambient water quality monitoring, with the possible exception of determining final compliance.[240]

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[234] MS4 PERMIT, supra note 232, at 5–6.

[235] TMDL GUIDANCE FOR MS4 PERMITS, *supra* note 94, at 8.

[236] *Id.*

[237] *See, e.g.,* MS4 PERMIT, *supra* note 232, at 19; WIS. DEP'T OF NAT. RESOURCES, GENERAL PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM: GREEN BAY METROPOLITAN SEWERAGE DISTRICT 19–23 (2016) [hereinafter GREEN BAY METROPOLITAN SEWERAGE DISTRICT DISCHARGE PERMIT], http://www.newwater.us/media/166777/Green Bay MSD-WPDES-Permit-2016.pdf [https://perma.cc/N48T-NEA6]; WIS. DEP'T OF NAT. RES., PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM: MILWAUKEE METRO SEWERAGE DISTRICT COMBINED 59–60 (2014) [hereinafter MILWAUKEE METRO SEWERAGE DISTRICT PERMIT], https://www.mmsd.com/application/files/3314/8302/3136/2013_Discharge_Permit_As_Modified_12112014.pdf [https://perma.cc/L74T-RDFR] (providing a schedule for when the municipality must meet certain WQBELs for phosphorus).

[238] *See supra* notes 102–110 and accompanying text.

[239] *See* MS4 PERMIT, supra note 232, at 4–7.

[240] TMDL GUIDANCE FOR MS4 PERMITS, *supra* note 94, at 3.

The state's general permit requirements for MS4 discharges to impaired non-TMDL waterbodies are fewer and less detailed than those for MS4 discharges to TMDL waterbodies. The state's general permit requires only that within ninety days of permit coverage and "by March 31 of each odd-numbered year thereafter," an MS4 establish whether it discharges to an impaired waterbody."[241] If a permittee discharges to an impaired waterbody, it must amend its stormwater management plan to include a discussion of control measures it will use to "reduce with the goal of eliminating, the discharge of pollutant(s) of concern that contribute to the impairment of the waterbody."[242] The permittee must also explain why it chooses particular control measures.[243] No additional information respecting WQBEL determination, timelines, or monitoring requirements for MS4 discharges to impaired non-TMDL waterbodies is provided.

3. Recommendations for Wisconsin's MS4 Program: Numeric WQBEL Determinations, Measurable Milestones, Monitoring, Compliance Schedules and Discharges to Non-TMDL Impaired Waterbodies

Since the state began its MS4 program in 1993, Wisconsin has gained considerable experience administering MS4 permits. As shown in **Figure** 16, Wisconsin administers fourteen individual MS4 permits, six individual group MS4 permits (covering fifty-four permittees), and a general MS4 permit (covering nearly two hundred entities).[244] Moreover, through its twenty percent TSS reduction requirement and its work on the development of a watershed permit framework in the Menomonee River watershed, the state has gained experience utilizing a watershed planning approach to address MS4 nutrient loading. To build upon its solid foundation of work and continue progress integrating MS4 stakeholders into existing and future watershed planning and implementation efforts, Wisconsin could consider amending its MS4 permits and guidance.

This article recommends that Wisconsin consider several changes. First the state might revise its current guidance and general permit language, which states that it is sufficient for an MS4's control measures to achieve a pollutant reduction level that is only "comparable to [the] MS4's TMDL [wasteload allocation]," and for MS4s discharging to impaired non-TMDL waterbodies only to "try" to "reduce, with the goal of eliminating" pollutant discharges.[245] Sec-

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[241] MS4 PERMIT, supra note 232, at 4.

[242] *Id.*

[243] *Id.*

[244] Hartsook Oct. 17 Email, *supra* note 95. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[245] *See* TMDL GUIDANCE FOR MS4 PERMITS, *supra* note 94, at 8; MS4 PERMIT, supra note 232, at 4; *supra* notes 233, 242 and accompanying text.

ond, the state could consider including clear interim reduction requirements that more closely resemble those applicable to POTWs participating in the adaptive management program. Third, Wisconsin could adopt more robust WQBEL monitoring requirements for MS4s. For examples, Wisconsin could look to permit language from small MS4 general permits in Washington and California that include innovative monitoring provisions.[246] In these states, permittees are required to organize, analyze, and recommend future actions based on collected monitoring data. Oregon's individual permits for Portland and Eugene provide additional examples of more robust monitoring techniques.[247]

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[246] *See* CAL. ENVTL. PROT. AGENCY, STATE WATER RES. CONTROL BOARD, WASTE DISCHARGE REQUIREMENTS FOR STORMWATER DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4S) (GENERAL PERMIT) 19 (2013) [hereinafter CALIFORNIA SMALL MS4 PERMIT], http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/phsii2012_5th/order_final.pdf [https://perma.cc/AM7L-RSGR]; STATE OF WASH., DEPT. OF ECOLOGY, EASTERN WASHINGTON PHASE II MUNICIPAL STORMWATER PERMIT 11 (2012) [hereinafter EASTERN WASHINGTON SMALL MS4 PERMIT], http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseiiEwa/2YR/2yrEWAPermit.pdf [https://perma.cc/5QWD-MTXP]; STATE OF WASH., DEPT. OF ECOLOGY, W. WASHINGTON PHASE II MUNICIPAL STORMWATER PERMIT 1 (2012) [hereinafter WESTERN WASHINGTON SMALL MS4 PERMIT], http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIIww/5YR/2014mod/WWAPhaseII-Permit-2014Final.pdf [https://perma.cc/5HS2-D8MS]. Washington's small MS4 general permit requires permittees, in collaboration with other small MS4s, to develop studies to assess the effectiveness of BMPs, collect relevant data during the study period, report interim results in annual reports, and separately report final results and recommendations based on findings. EASTERN WASHINGTON SMALL MS4 PERMIT, *supra*, at 19; WESTERN WASHINGTON SMALL MS4 PERMIT, *supra* at 13. In addition, in each annual report, the permit requires permittees to report on any additional stormwater monitoring that they or third parties conduct. EASTERN WASHINGTON SMALL MS4 PERMIT, *supra*, at 49–49; WESTERN WASHINGTON SMALL MS4 PERMIT, *supra* at 48–49. California's small MS4 general permit requires, *inter alia*, that permittees serving populations of 50,000 or greater conduct either: (1) a receiving water monitoring study that monitors areas upstream and downstream of a developing urban area, in accordance with specific parameter and protocols outlined in the permit; or (2) a tailored water quality monitoring study to assess the effectiveness of BMPs designed to reduce specific water quality pollutants that are contributing to an impairment. CALIFORNIA SMALL MS4 PERMIT, *supra*, at 9, 64. The permit encourages regional coordination in developing monitoring programs to save resources and promote comprehensive understanding of relevant watersheds. *Id.* at 62.

[247] OREGON DEP'T OF ENVTL. QUALITY, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM: MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) DISCHARGE 3 (2011) [hereinafter PORTLAND MS4 PERMIT], https://www.portlandoregon.gov/bes/article/507327 [https://perma.cc/9S4Y-RV9Z]; OREGON DEP'T OF ENVTL. QUALITY, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM: MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) DISCHARGE (2010) [hereinafter EUGENE MS4 PERMIT], https://www.eugene-or.gov/476/NPDES-Municipal-Stormwater-Permit [https://perma.cc/QDM3-59VL] (a PDF of the permit is available for download by going to webpage provided and clicking the link that says "Permit"); *see supra* note 221 and accompanying text (discussing EPA's recommendation that goals be "clear, specific, and measurable"). The Portland, Oregon permit requires permittees to develop and implement monitoring programs to support adaptive stormwater management and the evaluation of stormwater BMPs. PORTLAND MS4 PERMIT, *supra*, at 3. In designing monitoring projects, permittees are to identify monitoring objectives that address a monitoring question, background information, methodology, assumptions and rationale. *Id.* at 4. Monitoring programs must evaluate: pollutant sources, BMP effectiveness, status and long-term trends in water quali-

This article further recommends that Wisconsin consider utilizing MS4 WQBEL compliance schedules and synchronizing compliance schedules for entities located in the same watershed. To date, MS4s have shown varying levels of willingness to collaborate with POTWs on POTW-led planning efforts. For example, Madison Metropolitan Sewerage District ("Madison MSD") has had success working with MS4s, but the City of Oconomowoc and Milwaukee Metropolitan Sewerage District ("Milwaukee MSD") have had less success finding willing MS4 partners.[248] It is possible that additional MS4s would participate in ongoing watershed planning efforts if Wisconsin included compliance schedules in its MS4 permits and discussed the same more clearly in its MS4 guidance.[249] If MS4s and POTWs were subject to similar compliance

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ty, chemical, biological and physical effects of discharges, and progress in meeting pollutant reduction load benchmarks. Environmental monitoring requirements include: instream monitoring, storm event monitoring, macro-invertebrate monitoring, geomorphic condition monitoring and structural BMP monitoring. *Id.* To evaluate interim and final pollutant load reductions permittees are required to use empirical modeling as well as water quality trend analysis. *Id.* at 23. The permit also requires hydromodification and retrofit assessments to help build additional planning capacity. *Id.* at 12.

[248] Interview with Kevin Shafer, Exec. Dir., & Karen Sands, Sustainability Manager, Milwaukee Metro. Sewerage Dist., in Milwaukee, Wis. (Oct. 4, 2016) [hereinafter Shafer & Sands Interview]; Interview with Tom Steinbach, Operations Manager, City of Oconomowoc Wastewater Treatment Facility, in Oconomowoc, Wis. (Oct. 6, 2016) [hereinafter Steinbach Interview]; Interview with Dave Taylor, Dir. of Ecosystem Servs., Madison Metro. Sewerage Dist., in Madison, Wis. (June 9, 2016) [hereinafter Taylor Interview]; *see infra* notes 323–366 (Madison Metropolitan Sewerage District case study), 367–392 (City of Oconomowoc Metropolitan Sewerage Case study), 427–453 (Milwaukee Metropolitan Sewerage District case study) and accompanying text. In Madison, the willingness of MS4s to work with Madison MSD can likely be attributed to the cost difference between agricultural pollutant load reductions and urban pollutant load reduction. Given these economic considerations, Madison MSD was able to convince MS4s to participate in adaptive management, despite regulatory uncertainty. More specifically, Madison MSD was able to persuade MS4s that voluntarily assuming additional costs and implementation requirements ahead of schedule was better than taking a wait and see approach because that kind of approach could leave MS4s stuck implementing much more expensive urban BMPs to achieve load reductions when new, more restrictive WQBELS became effective. Taylor Interview, *supra*. Although Oconomowoc's adaptive management plan also shows significant cost savings for its MS4, other MS4s have thus far been unwilling to participate in the City's adaptive management plan. Steinbach Interview, *supra*. Similarly, Milwaukee MSD has had challenges finding MS4 partners, despite having shown the economic benefits of its approach and offering to specifically tailor its green infrastructure plan for individual municipalities. Shafer & Sands Interview, *supra*.

[249] For instance, MS4s covered under the general permit and located in the Rock River basin are required to update their storm sewer maps by March 31, 2016 and to evaluate whether current controls are sufficient to meet applicable TMDL allocations and, if not, to develop a proposed compliance schedule by March 31, 2018. For MS4 general permittees located in the Greater Milwaukee River watershed (relevant to Milwaukee MSD's planning efforts), where the TMDL is still pending, the general permit currently imposes no deadlines by which MS4s must develop plans to reduce their nutrient loads. When the Greater Milwaukee River watershed TMDL is finalized, it will require updated sewer maps within 24 months of TMDL approval and evaluation of current controls and proposed compliance schedules within 48 months of TMDL approval. In the first instance, the MS4 general permit deadlines lag substantially behind Oconomowoc's planning schedule and may be contributing to coordination challenges in that watershed; in the second, the lack of any timelines for the MS4s may be stifling MS4s willingness to collaborate with Milwaukee MSD on the implementation of its regional green infrastructure plan.

schedules, MS4s might be less likely to abstain from participation in watershed planning efforts out of a concern that participation would tie them to additional data gathering, monitoring and implementation requirements. This is important because delayed MS4 participation not only potentially undermines the pace and breadth of watershed plan development and implementation, and the realization of associated environmental, economic and social benefits, it also has the potential to create unnecessary procedural and administrative inefficiencies—i.e., multiple plan and permit amendments and notice and comment periods. Washington's small MS4 general permit provides an example of expedited planning and implementation compliance schedule requirements for discharges to impaired non-TMDL waterbodies.[250] Additionally, the new small MS4 general permit for Massachusetts includes a compliance schedule with specific and measurable structural and nonstructural BMP implementation requirements for discharges to TMDL waterbodies.[251] Wisconsin could look to these permits for model language.

This article also recommends that Wisconsin consider revising its MS4 permits and guidance to make WQBEL requirements equally applicable to MS4s discharging to impaired non-TMDL waterbodies. If MS4 permit requirements for discharges to impaired non-TMDL waterbodies are more lax than those for TMDL waterbodies, MS4s may be less inclined to participate in

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[250] *See* EASTERN WASHINGTON SMALL MS4 PERMIT, *supra* note at 13; WESTERN WASHINGTON SMALL MS4 PERMIT, *supra* note 246, at 13, 14. Washington's permit requires permittees to submit a notice within thirty days of becoming aware that their discharge has the reasonable potential to cause or contribute to an exceedence of water quality standards. EASTERN WASHINGTON SMALL MS4 PERMIT, *supra* note 246, at 18; WESTERN WASHINGTON SMALL MS4 PERMIT, *supra* note 246, at 12. Within sixty days, or another date determined by the permitting authority, of receiving a confirmatory notice, permittees are responsible for submitting an adaptive management plan including, *inter alia*, an implementation plan. And upon approval of the plan, permittees are required to immediately begin implementation in accordance with an approved schedule. EASTERN WASHINGTON SMALL MS4 PERMIT, *supra* note 246, at 19; WESTERN WASHINGTON SMALL MS4 PERMIT, *supra* note 246, at 13.

[251] MASS. DEP'T OF ENVTL. PROT, GENERAL PERMITS FOR STORMWATER DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS IN MASSACHUSETTS 10 (2016) [hereinafter MASS. SMALL MS4 PERMIT], https://www3.epa.gov/region1/npdes/Stormwater/ma/2016fpd/final-2016-ma-sms4-gp.pdf [https://perma.cc/8YTJ-MM7G]. For discharges to the Charles River, the Region 1 permit requires the preparation of a twenty year Phosphorus Control Plan ("PCP"). *Id.* at 17; *see* MASS. DEP'T OF ENVTL. PROT, GENERAL PERMITS FOR STORMWATER DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS IN MASSACHUSETTS: APPENDIX F, at 2 (2016), https://www3.epa.gov/region1/npdes/Stormwater/ma/2016fpd/appendix-f-2016-ma-sms4-gp.pdf [https://perma.cc/B4BA-UGSY] (published separately, but incorporated throughout the permit by reference). The permit includes a comprehensive timeline with milestones including, *inter alia*, a: legal analysis, funding assessment, baseline evaluation, description/plan for nonstructural controls, descriptions/plans for structural controls, description of operation and maintenance program, completion of three implementation schedules, implementation of nonstructural controls, implementation of structural controls in accordance with phosphorus export milestones, and performance evaluations. MASS. SMALL MS4 PERMIT, *supra*, at 10–12. The permit requires full implementation of all nonstructural controls within 6 years and implementation of structural controls sufficient to achieve numeric phosphorus export milestones stepped up over a twenty-year period. *Id.* at 46, 52.

the development of TMDL-alternative watershed plans for impaired non-TMDL waterbodies. By revising the structure of its permits and guidance, the state could potentially increase the use of TMDL-alternative watershed plans where they are the best choice for addressing impaired waterbodies.

Wisconsin may also want to reconsider the appropriateness of a general permit for implementing WQBELs. If individual WQBEL requirements and implementation measures cannot be sufficiently addressed by amending the general permit, Wisconsin may need to consider issuing individual permits in lieu of general permits or using a hybrid approach. Under a hybrid approach, proposed implementation measures for the six minimum measures could be addressed in the general permit and proposed implementation measures for WQBELs could be addressed in NOIs. If Wisconsin adopts a hybrid approach, NOIs including WQBEL implementation measures would then need to be individually publicly noticed and approved.[252] Selecting a hybrid approach for addressing MS4 WQBEL requirements would align Wisconsin's policy with the hybrid approach that EPA finalized as one of three policy options in its revised small MS4 rule.[253]

There are many potential benefits to incorporating these proposed MS4 policy recommendations. Incorporating this article's recommendations could facilitate increased data gathering needed for successful watershed planning and implementation in urban areas and build the planning and adaptive management capacity of MS4s. Moreover, the above recommendations could help Wisconsin better align its MS4 policy with EPA's most recent MS4 WQBEL guidance, 303(d) vision statement and revised small MS4 rule.[254] Compliance with federal requirements and guidance ensures that the state will be able to maintain its delegated authority to administer its MS4 program.

C. Agricultural Nonpoint Source Policy: Better Integrating Agricultural Producers into Watershed Planning

Like MS4s, agricultural producers are key stakeholders that must be engaged in watershed planning and implementation to effectively address nutrient impaired waterbodies. Federal nonpoint planning requirements and guidance provide somewhat more substance in the section 319 context than in the TMDL context but do not fully address implementation or integration of section 303(d), 319, and local-level conservation programming. Through a revised approach to its section 319 and LWRM planning policies, and without resorting to a stricter regulatory approach, Wisconsin could better ensure that agri-

[252] MS4 General Permit Remand Proposed Rule, *supra* note 204, at 429.

[253] *See* MS4 General Permit Remand Final Rule, *supra* note 230, at 89,324; FINAL RULE FACT SHEET, *supra* note 226, at 2.

[254] *See supra* notes 219–231 and accompanying text.

cultural BMPs are developed and implemented as part of a statewide comprehensive watershed planning process focused on addressing water resource concerns through small-scale watershed planning.[255] This section discusses section 319 nonpoint planning program requirements and guidance; reviews Wisconsin's current approach to nonpoint programming at the state and local levels; and makes program recommendations.

1. Section 319 Nonpoint Program Statutory Requirements and EPA Guidance

As discussed in the introduction, CWA section 319 nonpoint provisions, which are applicable to non-CAFO agricultural producers, do not include a permit program.[256] Instead, Section 319 requires that states complete a nonpoint management program plan to address agricultural pollutant loading.[257] The CWA provides that state nonpoint management program plans must: (1) identify BMPs; (2) identify implementation programs; (3) provide a schedule with milestones; (4) certify that state law provides adequate authority to address nonpoint pollution; (5) identify sources of and uses for funding; (6) identify programs and projects; (7) utilize local and private experts to the maximum extent practicable; and (8) utilize a watershed framework to the maximum extent practicable.[258] In its guidance, EPA provides that states should update their nonpoint source management program plans every five years.[259] EPA also recommends that states strengthen working partnerships, use a prioritization framework to identify watersheds impaired by NPS pollution, restore impaired watersheds through watershed-based plans, and incorporate adaptive management and effective financial management.[260]

In addition, Section 319 creates a grant program to support states' nonpoint management programs.[261] Once a state has completed a nonpoint management program plan, and has made "satisfactory progress" implementing it in the previous fiscal year, the federal government may provide up to sixty percent of the

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[255] With the exception of Concentrated Animal Feeding Operations ("CAFOs"), which the state is required to regulate as point sources under the CWA, the state does not currently utilize a regulatory permit approach for agricultural producers. Instead, the state uses a quasi-regulatory cost-share approach. *See* WIS. ADMIN. CODE ATCP §§ 50.61–50.98; *supra* notes 90–96 and accompanying text. Some states have adopted regulatory approaches that require agricultural producers to address their polluted runoff without cost share. U.S. ENVTL. PROT. AGENCY, NONPOINT SOURCE CONTROL BRANCH, A NATIONAL EVALUATION OF CLEAN WATER ACT SECTION 319 PROGRAM, at 33–46 (2011), https://www.epa.gov/sites/production/files/2015-09/documents/319evaluation.pdf [https://perma.cc/867X-6X2U].

[256] *See* 33 U.S.C. § 1329(b) (2012); *supra* notes 90–96 and accompanying text.

[257] 33 U.S.C. § 1329(b).

[258] *Id.*

[259] GUIDELINES FOR STATES AND TERRITORIES, *supra* note 11, at 15.

[260] *Id.* at 53–59.

[261] 33 U.S.C. § 1329(h).

state's implementation costs.[262] EPA guidance notes that in determining "satisfactory progress," the agency will review activities, reports and other documents. The guidance also notes that an updated state nonpoint management program plan is critical to a satisfactory progress determination. To ensure a balance between program administration and project implementation, EPA states that at least fifty percent of 319 grant funds should be set aside for nine key element watershed project implementation.[263] As previously noted, the agency also recommends the use of HUC 12 scale nine key element watershed plans.[264]

2. Wisconsin's Nonpoint Planning Policies: State and Local-level Nonpoint Planning

Wisconsin's current nonpoint management program plan for the state serves more as an informational plan than as a working watershed planning document.[265] Instead of identifying and prioritizing small-scale watershed plans for areas impacted by nonpoint sources and tracking plan implementation components, the document focuses on providing information on past and current nonpoint programs.[266] Although the plan includes a tracking and evaluation section, that section does not focus on plan implementation and water quality improvements.[267] Instead, it incorporates by reference existing performance measures for the state's relevant agricultural and water programs.[268] Wisconsin's nonpoint management program plan references the state's Nutrient Reduction Strategy, Integrated Assessment of Watershed Health, and revised 303(d) prioritization framework, but fails to use those documents to identify and prioritize watershed plan development and implementation for watersheds impacted by nonpoint sources.[269]

At the local level, as discussed previously in Part One, Wisconsin focuses on implementing its NSPS for agriculture through LWRM plans.[270] The state has integrated the nine key elements into its LWRM planning program, but it has not adopted a HUC 12 watershed approach for LWRM plan development

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[262] *Id.*

[263] GUIDELINES FOR STATES AND TERRITORIES, *supra* note 11, at 2.

[264] *Id.* at 11.

[265] NONPOINT SOURCE PROGRAM MANAGEMENT PLAN, *supra* note 74, at 52. The state's Areawide Water Quality Management Plan is an example of a working planning document. It is a large plan comprised of smaller plans containing implementation recommendations that are collectively reviewed and referenced. *Wisconsin Areawide Water Quality Management Plan*, WIS. DEP'T OF NAT. RES. (Sept. 29, 2016), http://dnr.wi.gov/topic/surfacewater/planning.html [https://perma.cc/8ZEL-HFJU] (describing the Areawide Water Quality Management Plan and Outlining the various documents that together comprise the plan).

[266] *See* NONPOINT SOURCE PROGRAM MANAGEMENT PLAN, *supra* note 74, at 9–11.

[267] *Id.* at 86–97.

[268] *Id.*

[269] *See id.* at 30–41.

[270] *Id.* at 8.

or provided planning technology tools to LWCDs.[271] Although LWRM plan regulations require that LWCDs perform monitoring, the tracking systems that facilitate monitoring vary across the state.[272] Some LWRM departments lack any formal tracking systems, while others use paper files; only a few have sophisticated Geographic Information System ("GIS") systems.[273] State LWRM policy also fails to provide for a staff planning position within each LWCD and ensure that this staff has adequate training.

Despite current challenges and policy gaps, Wisconsin's LWCD professionals have built strong relationships with agricultural producers and gained experience developing and implementing mainly county-based LWRM plans.[274] Additionally, POTWs working on local adaptive management projects have had notable success working with agricultural producers and integrating agricultural BMPs into adaptive management plans.[275] Although POTW adaptive management efforts are significant, the adaptive management program will not drive watershed planning in areas without major POTWs to develop and implement plans. Moving forward, in those areas, LWCDs will continue to bear the responsibility for planning. Brown, Outagamie, and Calumet LWCDs have acted as leaders in developing nine key element HUC 12 watershed plans rather than plans that follow county lines.[276] With significant additional funding, these LWCDs could work with agricultural producers to implement these plans.

Stakeholders in Wisconsin also face the common challenge of incorporating conservation practices from the U.S. Natural Resources Conservation Service ("NRCS") into watershed planning.[277] NRCS conservation practices, funded through the farm bill, reduce soil erosion and help curb nutrient runoff. These practices are effective and Congress provides substantial funding for NRCS conservation practice implementation. Accordingly, incorporating these

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[271] *Id.* at 8, 59–60, 65–66 (discussing the role of LWRM plans within the state); *see supra* notes 97–99 and accompanying text (same).

[272] BAUMANN ET AL., *supra* note 21, at 71. Currently, some counties are using proprietary systems developed by outside contractors—Flat Rock Geographics, Transcendent, and CH2M. E-mail from Jim Vandenbrook, Exec. Dir., Wis. Land & Water, to author (Jul. 18, 2016, 14:31 CST) (on file with author).

[273] BAUMANN ET AL., *supra* note 21, at 71.

[274] Interview with Jim Baumann, Water Quality Eng'r, Wis. Dep't of Nat. Res., & Jim Vandenbrook, Exec. Dir., Wis. Land & Water, in Madison, Wis. (Jun. 8, 2016) [hereinafter Baumann & Vandenbrook Interview].

[275] *See* discussion *infra* Part Three.

[276] *See infra* notes 299–302 and accompanying text (discussing model nine key element plans).

[277] Through various voluntary conservation programs USDA funds the implementation of conservation practices. MEGAN STUBBS, CONGR. RESEARCH SERV., CONSERVATION PROVISIONS IN THE 2014 FARM BILL (2014). Conservation practices are also required as a condition of federal crop insurance. 16 U.S.C. §§ 3811, 3821.

practices into watershed planning is critical.[278] Absent individual producer consent, however, privacy provisions in the 2008 Farm Bill prohibit NRCS employees, or those working with NRCS to provide technical assistance, from sharing the identity of producers participating in conservation programs or the location or other relevant information pertaining to land and operations of producers participating in federal conservation programs.[279] This means that LWCDs working on watershed plans must get consent from individual farmers before they can get baseline conservation data for plan development from NRCS or share BMP implementation information to demonstrate planning progress. Wisconsin does not provide guidance to LWCDs on how to address federal privacy requirements and effectively integrate federal conservation practices into watershed plans.

3. Recommendations: Statewide Working Nonpoint Program Plan, Local HUC 12 Watershed Plans, LWCD Planning Staff, Planning Technology Tools and Training

At the state level, this article recommends that Wisconsin amend its nonpoint source management program plan to make it a working planning document.[280] Wisconsin could revise its nonpoint source management program plan to include a section that identifies, tracks, and monitors HUC 12 watershed plans for 303(d) priority waterbodies impacted by nonpoint sources. This approach could better coordinate the state's 303(d), 319, and LWRM programs, increase focus on BMP implementation in impaired watersheds with nonpoint sources, and facilitate tracking and assessment of implementation progress.[281] Such an approach would also better fulfill the federal recommendation that states utilize a prioritized watershed-based plan approach to nonpoint programming as well as recommendations regarding federal and local partnerships, expert collaboration, and adaptive management.[282] Moreover, the proposed approach could simplify

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[278] As demonstrated by Green Bay MSD's adaptive management pilot program and Madison MSD's adaptive management plan, integrating federally funded conservation practices into watershed projects can substantially increase funding for BMP implementation. *See infra* note 393–426 and accompanying text. NRCS practices comprise approximately eighty percent of the practices that are being implemented through Green Bay MSD's pilot program, and approximately twelve percent of practices being implemented through Madison MSD's adaptive management program. Interview with Bill Hafs, Dir. of Envtl. Programs, Green Bay Metro. Sewerage Dist., in Green Bay, Wis. (Jun. 9, 2016) [hereinafter Hafs Interview]; Taylor Interview, *supra* note 248.

[279] CLEAN WATER ACT: CHANGES NEEDED, *supra* note 51, at 32.

[280] *See supra* note 265 and accompanying text.

[281] *See supra* notes 265–269 and accompanying text.

[282] *See supra* note 136 and accompanying text.

the administrative burden of demonstrating "satisfactory progress," which is a prerequisite for section 319 grant eligibility.[283]

At the local level, Wisconsin could make LWCDs the lead planning stakeholders responsible for developing HUC 12 watershed plans in priority areas identified through the state's 303(d) and 319 programs. To implement this recommendation, this article recommends that the state consider amending its LWRM regulations to include priority HUC 12 plan development and creating designated planning staff positions within LWCDs.

To set LWCDs up for success in undertaking this significant additional planning responsibility, Wisconsin will also need to provide LWCDs with GIS-based tools and training,[284] because planning and implementation at the HUC 12 scale cannot be carried out in a meaningful timeframe using a paper and pencil approach. [285] A training program would help ensure that LWCD staff can effectively utilize new technology. A training program could focus on data gathering, identifying and prioritizing BMPs, tracking implementation progress, and carrying out adaptive management.

Rather than developing a new technology tool for watershed planning and implementation, it may be possible to make public or use as a model existing

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[283] GUIDELINES FOR STATES AND TERRITORIES, *supra* note 11, at 47; *see id.* at 47–51 (articulating how EPA will assess state progress).

[284] At HUC 12 scale, watershed plans will cover between ten and forty thousand acres. *See* **Figure** 12, *supra* note 191.

[285] Stakeholders that have successfully completed HUC 12 watershed plans aimed at addressing agricultural loading have utilized GIS tools. Taylor Interview, *supra* note 248; Interview with Bill Hafs, Dir. of Envtl. Programs, Jeff Smudde, Watershed Programs Manager, Green Bay Metro. Sewerage Dist., in Green Bay, Wis. (Oct. 11, 2016). For example, in Green Bay Metropolitan Sewerage District's ("Green Bay MSD") adaptive management pilot project and Brown, Outagamie and Calumet's nine key element plans, planners used GIS tools to gather data including streambank erosion, wetlands, grazing/ pastureland areas, crop rotations, land cover/ tillage practices, barnyards, livestock numbers, drain tiles/ internally draining areas, and nutrient management practices. OUTAGAMIE CTY. LAND CONSERVATION DEP'T, NONPOINT SOURCE IMPLEMENTATION PLAN FOR THE PLUM AND KANKAPOT CREEK WATERSHED 61 (2014) [hereinafter PLUM AND KANKAPOT CREEK WATERSHED], http://www.outagamie.org/modules/showdocument.aspx?documentid=33151 [https://perma.cc/Z2VC-XV5S]; OUTAGAMIE CTY. & BROWN CTY. LAND CONSERVATION DEP'TS, NONPOINT SOURCE IMPLEMENTATION PLAN FOR THE UPPER EAST RIVER WATERSHED 46 (2016) [hereinafter UPPER EAST RIVER WATERSHED], http://dnr.wi.gov/topic/nonpoint/documents/9kep/UpperEastRiver-Plan.pdf [https://perma.cc/295Y-F6KN]. In addition, Green Bay MSD used GIS-based tools to map and analyze soil samples for its planning area. After collecting inventory data, planners used GIS tools to map, identify and prioritize BMP measures. Green Bay MSD's project demonstrates that highly variable levels of legacy phosphorus can exist in a relatively small (2,400 acre) area, even if 100% of agricultural producers are following nutrient management plans. *See* GREEN BAY METRO. SEWERAGE DIST., SILVER CREEK SEDIMENT AND NUTRIENT REDUCTION AND HABITAT RESTORATION SEMI-ANNUAL REPORT 8 (2015) [hereinafter SILVER CREEK SEMI-ANNUAL REPORT] (on file with author). In Green Bay MSD's small pilot project area, concentrations of P in soil samples ranged from 3-553 parts per million (ppm) and more than 25% of fields had average phosphorus contents of 50 ppm or greater. *Id.*

GIS tools.[286] For example, the state may be able to standardize the inventory procedures and GIS tools that Green Bay Metropolitan Sewerage District ("Green Bay MSD") has developed to carry out its adaptive management pilot project or the multi-county tracking system that the Fox Wolf Watershed Alliance is working with Brown, Outagamie, Calumet, and Winnebago counties to develop.[287] The state could also consider integrating the U.S. Department of Agriculture, Agricultural Research Service's Agricultural Conservation Planning Framework ("ACPF") tool into its LWRM program.[288] Although this article recommends that LWCDs, because of their expertise and local knowledge, take the lead in HUC 12 planning, it also recommends that the final suite of practices selected for a HUC 12 watershed be chosen through local-level deliberations with producers and other watershed stakeholders and that final plans consider productivity and soil health as well as water quality.

When Farm Bill conservation program funds are utilized for agricultural BMP implementation, this article recommends that Wisconsin consider a policy in which LWCDs request limited disclosure waivers from producers. Limited disclosures would enable the tracking and reporting of practice implementation data while also protecting producer privacy. In implementing this approach, the state could look to Brown County LWCD, which has had success utilizing producer disclosure agreements, and also Madison MSD and the City of Oconomowoc, which have worked with producers to identify an approach for reporting implementation data in a locally aggregated fashion. Use of limited disclosure agreements would enable LWCDs to better integrate NRCS conservation practices into watershed planning, track and monitor implementation, and report on progress at a scale meaningful for measuring impacts on water quality, while simultaneously continuing to protect producer privacy.[289] In some areas, it may be the case that producers are amenable to highlighting their participation in watershed planning and receiving recognition for practice implementation. In such cases, full waivers would be appropriate and practice data could be tracked and reported without aggregation.

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[286] *See supra* notes 272–273 and accompanying text.

[287] *See generally Watershed Recovery*, FOX WOLF WATERSHED ALLIANCE, https://fwwa.org/our-work/watershed-recovery/ [https://perma.cc/ZSL9-8CHA].

[288] *See* Tomer et al., *supra* note 188, at 754–55. The ACPF GIS-based tool allows planners to use publicly available soils, land use and elevation data, aggregate data at the HUC 12 scale using Agricultural Research Service developed databases, and generate alternative conservation practice scenarios for reducing nutrient discharges from HUC 12 watersheds. *Id.* Compared to other water quality modeling options, the ACPF tool requires modest technical expertise, but conservation practice scenarios generated using the ACPF tool can be further evaluated using more complex watershed simulation modeling. *Id.* Standard use of the ACPF tool in LWCD HUC 12 planning would ensure that soils, land use, and elevation data are being utilized in a consistent manner and uniform criteria are being used to identify and prioritize locations for conservation practices. *See id.*

[289] *See supra* notes 277–279 and accompanying text.

D. Funding

Half of Wisconsin's waterbodies are nutrient-impaired.[290] Restoring water quality to nutrient impaired waterbodies in the state through the watershed approach proposed herein will likely require a significant increase in state funding for the development and implementation of HUC 12 watershed plans.[291]

The need for increased funding can be seen when one compares current levels of state funding to the potential cost of developing and implementing HUC 12 plans in just the Wisconsin River watershed, which covers approximately fifteen percent of the state.[292] The Wisconsin River Watershed covers 9156 square miles—5,859,840 acres—and agricultural land use comprises twenty-five percent—1,464,960 acres—of that area.[293] Assuming agricultural BMPs are needed on sixty-five percent of land in the Wisconsin River watershed, and assuming HUC 12 BMP implementation and staffing match the lowest estimates for the Upper East nine key element plan developed by Brown and Outagamie LWCDs, then a low cost implementation estimate for HUC 12 planning and implementation in the Wisconsin River Watershed falls between

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[290] BAUMANN ET AL., *supra* note 21, at 6.

[291] Currently, Wisconsin receives federal funds that help to address agricultural nonpoint runoff from the Natural Resource Conservation Service ("NRCS") and EPA. Federal funding to address NPS runoff has historically been greater than state funding, but is not likely to be sufficient. Although not all NRCS funding is directed toward the NPS program priorities, in 2015, NRCS made fifty-one million dollars available for implementing its conservation programs in the state. In 2015 and 2016, EPA provided approximately four million dollars per year in section 319 nonpoint funding to the state. In addition to these funds, watershed stakeholders have also received some funding from the Great Lakes Restoration Initiative, the Mississippi River Basin Healthy Watershed Initiative, and the U.S. Geological Survey. NAT. RES. CONSERVATION SERV., WISCONSIN ANNUAL REPORT 6 (2015), https://www.nrcs.usda.gov/wps/portal/nrcs/detail/wi/newsroom/releases/?cid=NRCSEPRD429008 [https://perma.cc/3MGZ-RHGR] (report available for download by selecting the link "NRCS 2015 Wisconsin Annual Report"). EPA funding is estimated by multiplying the percentage of section 319 grant funding made available to Wisconsin in 2015 and 2016, 2.59%, by the total amount of 319 funding made available in these years. It is an overestimate because it includes amounts that must be reserved and distributed to Indian Tribes. GUIDELINES FOR STATES AND TERRITORIES, *supra* note 11, at 69; Hafs Interview, *supra* note 278.

[292] Currently, Wisconsin provides state funding to municipalities and counties to address precipitation-driven pollutant loads through three main programs: (1) the Targeted Runoff Management ("TRM") Grant Program; (2) the Notice of Discharge ("NOD") Grant Program; and (3) the Urban Nonpoint Source and Stormwater Management ("UNPS") Grant Program. Between 2013 and 2015, the state awarded between three and four million dollars annually through the TRM grant program to local units of government. During that same time period, the state awarded approximately the same amount annually through the UNPS grant program. And, in 2015, in total, Wisconsin agencies allocated approximately nineteen million dollars in state and federal funds to counties to address agricultural nonpoint source pollution. WATER QUALITY EXECUTIVE SUMMARY, *supra* note 181, at 8–10.

[293] Adam Freihoefer, Water Use Section Chief, Wis. Dep't of Nat. Res., Presentation at the Wisconsin River Symposium: Defining Land Management in the Wisconsin River Basin (Feb. 14, 2014), http://dnr.wi.gov/topic/TMDLs/documents/WisconsinRiver/Symposium/2014/2014_freihoefer.pdf [https://perma.cc/QE8T-XHRX] (stating the portion of the Wisconsin River Watershed that supports agricultural land use); *Framework for Water Quality Improvement*, *supra* note 191 (stating the size of the Wisconsin River Watershed).

$261,379,524 and $269,662,614.[294] Similar HUC 12 nine key element planning and implementation is likely needed across the state in the areas identified in Wisconsin's Prioritization Framework. By way of comparison, in the neighboring state of Iowa, experts have estimated that it will cost between $1.2 and $4 billion to implement agricultural BMPs to achieve a forty-five percent reduction of nitrate and phosphorus loading.[295]

To begin to address the funding challenge and restore water quality in the state in a reasonable timeframe, Wisconsin could consider creating a new state trust fund. Wisconsin could look to Minnesota and Iowa, which have amended their state constitutions to create such funds.[296] On July 1, 2009, to generate revenue for its new Minnesota Legacy Fund, Minnesota temporarily increased the state's sales tax by three-eighths of one percent.[297] During fiscal year 2014–2015 the tax provided nearly $195 million that could be used to address water resource concerns.[298] A similar funding mechanism in Wisconsin would enable the state to begin scaling up watershed planning and implementation through its LWRM program and could significantly increase the pace of waterbody restoration. Accordingly, this article recommends that Wisconsin consider creating a new state funding mechanism similar to the Minnesota Legacy Fund. This article further recommends that the state distribute funds generated through the new mechanism to LWCDs to enable the development and implementation of needed HUC 12 plans.

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[294] *See* UPPER EAST RIVER WATERSHED, *supra* note 285, at 90; Freihoefer, *supra* note 293; *Framework for Water Quality Improvement*, *supra* note 293. Brown and Outagamie Counties conservatively estimate, not counting costs for the development of new technologies, that the cost to implement the HUC 12 Upper East nine key element plan, which covers 22,992 acres, will be between $6,311,160 and $6,511,160. UPPER EAST RIVER WATERSHED, *supra* note 285, at 90. The counties estimate that to develop the new technology required to achieve load reductions from the Lower Fox River TMDL will cost between ten to twenty million dollars. UPPER EAST RIVER WATERSHED, *supra* note 285, at 90.

[295] IOWA DEP'T OF AGRIC. & LAND STEWARDSHIP ET AL., IOWA NUTRIENT REDUCTION STRATEGY: A SCIENCE AND TECHNOLOGY-BASED FRAMEWORK TO ASSESS AND REDUCE NUTRIENTS TO IOWA WATERS AND THE GULF OF MEXICO 4 (2013), http://publications.iowa.gov/23172/1/INRSfull-161001.pdf [https://perma.cc/D6A5-ULMK].

[296] *About the Funds*, MINN. STATE LEGISLATURE: MINN.'S LEGACY (2017), http://www.legacy.leg.mn/about-funds [https://perma.cc/6THH-3QZQ]; *About Us*, IOWA'S WATER & LAND LEGACY, http://www.iowaswaterandlandlegacy.org/about/ [https://perma.cc/36MG-PWXP]. Iowa's increase will become effective upon the next sales tax increase in the state. *About Us*, *supra*.

[297] This tax increase will continue annually until 2034. *About the Funds*, *supra* note 296.

[298] CLEAN LAND & WATER LEGACY AMENDMENT, CLEAN WATER FUND PERFORMANCE REPORT 8 (2014), http://legacy.leg.mn/sites/default/files/resources/2014_CleanWaterFund_Performance_Report.pdf [https://perma.cc/6BX5-SK64].

III. Model Nine Key Element Plans, Plans in Need of Further Review, and point Source Case Studies

This section discusses nine key element watershed plans developed by non-permittee stakeholders and watershed plans developed by point sources utilizing watershed permit compliance approaches. It covers model nine key element plans as well as nine key element plans in need of revision. Model nine key element plans discussed include plans for primarily agricultural areas and the urban component of a plan addressing both urban and agricultural areas.

A. Model Nine Key Element Plans

In recent years, non-permittee stakeholders have developed model watershed plans for urban and agricultural areas in Wisconsin. These plans have been developed at the HUC 12 scale to meet water quality standards and identify prioritized BMPs, developed through modeling based on granular inventory data. Watershed plans that follow the framework of the discussed model plans, if funded and implemented, could restore water quality in HUC 12 areas throughout the state.

1. Model Agricultural Plans: Plum & Kankapot Creek, Upper East River, and Upper Duck Creek Watershed Plans

The approved nine key element plans developed by Brown, Outagamie, and Calumet LWCDs for the Plum & Kankapot, Upper East River, and Upper Duck River are model HUC 12 nine key element plans for agricultural areas.[299] They provide comprehensive roadmaps for achieving water quality in ten years. In crafting these plans, planners completed comprehensive inventories and used data from these inventories to identify, prioritize, and model BMPs. Planners inventoried streambank erosion, wetlands, grazing and pastureland areas, crop rotations, land cover/tillage practices, barnyards, livestock numbers, drain tiles/internally draining areas, and nutrient management practices. Using the inventory data and a suite of modeling tools, planners developed a group of prioritized practices for each watershed that would achieve water quali-

[299] Plum And Kankapot Creek Watershed, *supra* note 285, at 11; Upper East River Watershed, *supra* note 285, at 1; Outagamie Cty. Land Conservation Dep't, Upper Duck Creek Nonpoint Source Watershed Implementation Plan 1 (2016) [hereinafter Upper Duck Creek Watershed], https://perma.cc/9EV5-Q5WE [https://perma.cc/9EV5-Q5WE]. The Plum & Kankapot plan covers 38,712 acres, the Upper East plan covers 22,997 acres, and the Upper Duck plan covers 30,854 acres. Plum And Kankapot Creek Watershed, *supra* note 285, at 16; Upper East River Watershed, *supra* note 285, at 1; Upper Duck Creek Watershed, *supra*, at 17.

ty standards.[300] Tables in each of the plans show implementation measures and associated costs, estimated load reductions for recommended BMPs, and water quality monitoring milestones and final success indicators.[301]

2. Model Urban Plan: Pike River Watershed Plan

The urban component of the watershed plan developed by Applied Ecological Services and the Root-Pike Watershed Initiative Network for the Pike River watershed provides a model urban HUC 12 watershed plan.[302] The plan includes a Management Measures Action plan with over 200 site-specific management measures. Management measure recommendations are based on field inventory data, watershed characteristics, and stakeholder input and are presented in jurisdiction specific tables.[303] To identify critical areas, the plan divided the watershed into twenty smaller-scale sub-watershed management units ("SMUs").[304] The plan includes interim, measurable milestones linked to evaluation criteria. In the aggregate, implementation of the site-specific measures in critical and high priority areas is estimated to exceed the phosphorus reduction necessary to restore water quality.[305]

B. Nine Key Element Plans in Need of Revision

In contrast to the model plans discussed above, three of the state's most recent nine key element plans—the St. Croix Basin, the Red Cedar River, and the Root River nine key element plans—are in need of revision. The plans are large-scale, do not incorporate recent inventory data, and do not provide road maps for restoring water quality.[306] Development of additional plans in this vein is not recommended.

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[300] PLUM AND KANKAPOT CREEK WATERSHED, *supra* note 285, at 84; UPPER EAST RIVER WATERSHED, *supra* note 285, at 95; UPPER DUCK CREEK WATERSHED, *supra* note 299, at 77.

[301] *See* PLUM AND KANKAPOT CREEK WATERSHED, *supra* note 285, at 103; UPPER EAST RIVER WATERSHED, *supra* note 285, at 90; UPPER DUCK CREEK WATERSHED, *supra* note 299, at 77.The Plum & Kankapot plan, not including an estimate for new technologies, is projected to cost $14,083,564.43. PLUM AND KANKAPOT CREEK WATERSHED, *supra* note 285, at 103. The Upper East plan is projected to cost between $6,311,160 and $6,511,160 with an additional ten to twenty million dollars in new technology costs. UPPER EAST RIVER WATERSHED, *supra* note 285, at 90. The Upper Duck plan is projected to cost $7,030,371 with an additional two million in new technology costs. UPPER DUCK CREEK WATERSHED, *supra* note 299, at 77.

[302] *Id.* The plan covers an area of 32,498 acres. APPLIED ECOLOGICAL SERVS., PIKE RIVER WATERSHED-BASED PLAN 23 (2013), http://www.rootpikewin.org/pike-river-plan/ [https://perma.cc/D98L-KUWC] (to download a PDF copy of the report use the links under the heading, "Plan Contents").

[303] *Id.* at 23, 177.

[304] *Id.* at 23.

[305] *Id.* at 164–65, 179.

[306] *See* LIMNOTECH, IMPLEMENTATION PLAN FOR THE LAKE ST. CROIX NUTRIENT TOTAL MAXIMUM DAILY LOAD 3, 11–14 (2013) [hereinafter ST. CROIX TMDL], https://www.pca.

1. Red Cedar River Plan

The 2015 Red Cedar River nine key element plan sets a goal of achieving a forty percent phosphorus reduction over a period of ten years.[307] When the state wrote the plan, it relied on TMDL data from the 1990s.[308] With respect to necessary agricultural BMPs, the plan states that much is unknown about the extent of BMPs in the watershed or their effectiveness.[309] Instead of providing a comprehensive analysis of loading reductions, the plan explains that it provides a "semi-quantitative analysis" and that estimations in the document are of the "back of the envelope" variety.[310] The plan also lacks monitoring and tracking components.[311]

2. St. Croix Plan

Although the St. Croix nutrient TMDL requires a twenty-seven percent reduction in nutrient loading, the 2013 St. Croix nine key element implementation plan establishes a tentative twenty percent reduction goal over a ten to thirty year period.[312] The plan estimates baseline using TMDL data from 1992.[313] Moreover, in discussing agricultural lands, the plan states that it is unknown how much progress implementing agricultural BMPs has been made since 1992.[314] The plan also discusses a county approach to implementation. However, a review of the county implementation plans shows lists of untargeted BMPs with rough estimates of costs and reductions and significant discussion regarding additional funding, staffing, and tools that will be required be-

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state.mn.us/sites/default/files/wq-iw6-04c.pdf [https://perma.cc/VN85-36T4]; RED CEDAR RIVER WATER QUALITY P'SHIP, A RIVER RUNS THROUGH US: A WATER QUALITY STRATEGY FOR THE LAND AND WATERS OF THE RED CEDAR RIVER BASIN 3, 8–9 (2015) [hereinafter RED CEDAR RIVER WATER QUALITY STRATEGY], https://fyi.uwex.edu/watershedplanning/files/2016/03/RedCedarPlanFinalMedResolution.pdf [https://perma.cc/CSL9-TLKY]; SE. WIS. REG'L PLANNING COMM'N, A RESTORATION PLAN FOR THE ROOT RIVER WATERSHED 2, 6–7 (2014) [hereinafter ROOT RIVER WATERSHED], http://www.sewrpc.org/SEWRPCFiles/Publications/CAPR/capr-316-root-river-restoration-plan-part-I.pdf [https://perma.cc/N37L-L28P]. The entire St. Croix basin covers 7760 square miles and is located in both Wisconsin and Minnesota. *See* ST. CROIX TMDL, *supra*, at 3. Wisconsin's portion of the St. Croix plan covers the fifty-six percent of the basin, or 2,780,800 acres. *Id.* The Red Cedar River plan covers 1,101,911 acres of the Red Cedar River watershed, including fifty-three HUC 12s. RED CEDAR RIVER WATER QUALITY STRATEGY, *supra*, at 3. The Root River plan covers 126,720 acres. ROOT RIVER WATERSHED, *supra*, at 95.

[307] RED CEDAR RIVER WATER QUALITY STRATEGY, *supra* note 306, at 18.

[308] *Id.* at 8.

[309] *See id.* at 19.

[310] *Id.*

[311] *See id.* at 49–54. With respect to tracking, the plan states that it aims to identify a tracking approach within the first two years of strategy implementation and will encourage periodic inspection by partners involved in installation. *Id.* at 51.

[312] ST. CROIX TMDL, supra note 306, at 35.

[313] *Id.* at 6–7.

[314] *Id.* at 17.

fore planning and implementation can occur. For example, Polk County discusses needing an additional eight full time staff to develop and implement a nine key element plan addressing loading in that county. The county also requests a GIS-based tracking tool to facilitate plan implementation.[315] Washburn County discusses funding needs. It states that current funding levels for conservation staff and technical assistance are drastically lower than what would be required to support plan development and implementation for that county.[316]

3. Root River Plan

The 2014 Root River nine key element plan does not aim to achieve water quality standards. Instead, it aims to achieve water quality improvement targets based on the modeled reductions identified in the Regional Water Quality Management Plan Update ("RWQMPU").[317] Planners used RWQMPU data from 2000 to develop the plan.[318] Although at the outset the plan states a five-year implementation timeline, later discussion makes clear that the timeline is indefinite.[319] The plan identifies, but does not include, pollutant load reduction estimates for seven agricultural BMP projects on private lands.[320] Although the plan identifies 240 specific project recommendations, only a small number of "high-priority" projects—ten urban stormwater management projects, twelve streambank erosion projects, nine riparian buffer projects, and ten invasive species projects—are actually proposed to be implemented early in the plan's implementation period.[321] For several of the specifically identified projects and high-priority projects, the plan does not include capital or operation and maintenance costs, but rather allows for cost allocation during project development.[322]

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[315] *Id.* app. B at 9 (Polk County).

[316] *See id.* app. B at 4 (Washington County).

[317] ROOT RIVER WATERSHED, *supra* note 306, at 429.

[318] *Id.* at 12.

[319] *Id.* at 33. The plan rates each project by level of priority and offers vague timetables for the completion of projects within each priority level:

> The Root River watershed restoration plan envisions that the majority of the high-priority projects will be completed within the five-year implementation period for this plan ending in 2014, with the balance of the high-priority projects being completed by the end of year 2024. It is envisioned that medium-priority projects will be completed over the period 2024–2039 and that low-priority projects will be completed after 2039.

Id. at 671–74.

[320] *Id.* at 52.

[321] *Id.* at 636–37.

[322] *See id.* at 650–51.

C. Point Source Planning Case Studies

Point sources in Wisconsin have begun investigating and using watershed-based permit compliance approaches including the development of watershed plans. The point source case studies presented in this section offer examples of some of the watershed plans that are being developed throughout the state including Madison MSD's adaptive management plan, the City of Oconomowoc's adaptive management plan, Green Bay MSD's adaptive management pilot project, and Milwaukee MSD's green infrastructure plan. This section also discusses the Menomonee River watershed group MS4 individual permit. The watershed plans discussed in this section should also be considered as models for watersheds with urban and agricultural land uses. This article includes these detailed case studies to aid others seeking to develop similar plans and make clearer the difference between onsite technology and watershed-based compliance approaches.

1. Madison MSD: Adaptive Management Plan

Madison MSD is a POTW operating in the Rock River Basin. It serves thirty customer communities over a 183 square mile area. Madison MSD discharges 32,000 pounds of phosphorus per year and its discharge represents eleven percent of the total phosphorus that enters the Yahara River Basin, a sub-watershed of the Rock River Basin.[323]

As discussed in Part Two, in 2011, EPA approved the state's TMDL for phosphorus and TSS for the Rock River Basin. Point sources in the basin include forty-eight MS4s, sixty-one POTWs, fifteen industrial wastewater treatment facilities, and twenty-seven CAFOs.[324] As shown by **Figures** 18 and 19, land use in the basin is: agricultural (62%); urban (4%), wetland (12%); grassland (11%); forest (7%); water (3%); barren (1%); and shrubland (0.1%).

Figure 18. Land Use in the Rock River Basin.[325]

Figure 19: Land use in the Rock River Basin.[326]

Instead of upgrading its filtration technology to comply with its WQBEL, Madison MSD, working with partners, has developed an adaptive management plan for the Yahara river sub-watershed, located in the west-central portion of the

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[323] Taylor Interview, *supra* note 248.

[324] ROCK RIVER TMDL, *supra* note 165, at 25–26.

[325] *Id.* at 13. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[326] *Id.* at 12. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

Rock River Basin.[327] The 343,474 acre planning area, which includes approximately 19 HUC 12s, contains eight impaired stream reaches and extends across three counties.[328] Twenty-three MS4s and seven municipal and industrial wastewater treatment facilities are located in this area. The upper portion of the planning area is predominantly dairy farms, the central portion features concentrated urban areas, and the lower portion is comprised mainly of cash crops.[329] **Figure** 22 shows a general land use breakdown for the planning area.[330]

The significant projected cost differences between technology and adaptive management compliance approaches created a strong incentive for Madison MSD and its point source partners to choose an adaptive management approach.[331] Madison MSD projects that to implement upgraded filtration tech-

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[327] MADISON METRO. SEWERAGE DIST., MADISON METROPOLITAN SEWERAGE DISTRICT ADAPTIVE MANAGEMENT PLAN 11 (2015) [hereinafter MADISON MSD ADAPTIVE MANAGEMENT PLAN], http://www.madsewer.org/Portals/0/ProgramInitiatives/YaharaWINs/Resources/Documents/Yahara%20WINS%20adaptive%20management%20plan%2012172015.pdf [https://perma.cc/LAK4-HKPU]. Madison MSD is working with twenty-two municipal point sources (POTWs and urban stormwater entities), two non-municipal point sources, four funding partners (three community organizations and the U.S. Geological Survey), an association of agricultural producers, and several other interested parties. *Id.* at 45–46. Six of Madison MSD's partners are individual discharge permit holders: three municipal wastewater treatment facilities, one electric utility company, and one state-owned fish hatchery. Many of the urban stormwater entities as well as Dane County and the University of Wisconsin-Madison operate under a joint stormwater permit. The remaining stormwater entities operate under the state's general stormwater permit. *See* WIS. DEP'T OF NAT. RES., PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM WPDES PERMIT NO. WI-S058416-3, at 2 (2009) [hereinafter GENERAL STORMWATER PERMIT], http://www.fitchburgwi.gov/DocumentCenter/View/419 [https://perma.cc/5PEK-FJR3].

[328] *Id.* at 11. The majority of the sub-watershed, 299,665 acres of it, is located in Dane County with smaller portions, 17,694 acres and 26,115 acres, in Columbia and Rock County respectively. *Id.* at 17.

[329] *Id.*

[330] MADISON MSD ADAPTIVE MANAGEMENT PLAN, *supra* note 327, at 20. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[331] *See* MADISON MSD ADAPTIVE MANAGEMENT PLAN, *supra* note 327, at 6. In addition to analyzing its own cost savings, Madison MSD evaluated cost saving for two other POTWs—the Oregon and Stoughton POTWs—and projects significant cost savings for those POTWs. *Id.* at 13–15. For the Oregon POTW to comply with a WQBEL of 0.13mg/L, Madison MSD estimates the facility would incur capital costs of $7.3 million and annual operation and maintenance costs of $363,000. *Id.* at 14. For the Stoughton POTW to comply with a WQBEL of 0.28 mg/L, Madison MSD estimates that the facility would incur capital costs of $5.1 million and annual operation and maintenance costs of $236,000. *Id.* In contrast, Madison MSD projects that under an adaptive management approach the POTWs would have annual adaptive management project costs of $80,000 and $5400 respectively. *Id.* Madison MSD also expects cost savings for participating municipal stormwater entities. Actual savings for urban stormwater treatment will vary depending on the cost of implementing urban BMPs in individual jurisdictions; however, because the watershed plan heavily focuses on agricultural BMPs, which are generally significantly less costly than implementing urban BMPs, stormwater control cost savings are expected in all jurisdictions. Although Madison MSD was unable to separately estimate urban stormwater entity cost savings, the facility estimates that the total cost savings from an adaptive management approach for both wastewater and stormwater treatment in the watershed will be $13.5

nology onsite to comply with a WQBEL of 0.13 mg/L life cycle costs for a thirty-year compliance term would be seventy eight million dollars.[332] Madison MSD further projects that this approach would have a capital cost of $104 million and annual operation and maintenance cost of $2.5 million.[333] In contrast, to implement an adaptive management compliance approach, Madison MSD estimates that life cycle costs for a thirty-year compliance term will be twelve million dollars.[334] Madison MSD also estimates that by participating in an adaptive management compliance approach, it will pass on wastewater treatment cost savings, of $3000 to $4,068,000, to its customer communities. In total, Madison MSD estimates annual savings for all of its wastewater customers will be $6,663,000.[335]

Beyond the economics, a practical consideration factored into Madison MSD and its MS4 partners' decisions to take an adaptive management compliance approach. More than half of the MS4s and Madison MSD have multiple discharge points and discharge to more than one stream.[336] By working together on an adaptive management plan, they are able to focus on achieving water quality standards at a smaller number of identified in-stream points of compliance.

After investigating these considerations and obtaining commission approval, Madison MSD embarked on a pilot project. Before proceeding to implementation, Madison MSD identified partners and entered into an intergovernmental agreement covering operational procedures and a funding mechanism.[337] Madison MSD also executed the first of two Memorandums of Understanding ("MOUs") with the state environmental agency.[338] Through imple-

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million per year. Email from Dave Taylor, Dir. of Ecosystem Servs., Madison Metro. Sewerage Dist. to author (May 11, 2016, 15:41 EST) [hereinafter Taylor Email] (on file with author).

[332] MADISON MSD ADAPTIVE MANAGEMENT PLAN, *supra* note 327, at 6.

[333] Dave Taylor, Dir. of Ecosystem Servs., Madison Metro. Sewerage District, Commission Presentation on Adaptive Management: Full-Scale Adaptive Management Progress Report (Dec. 17, 2015) [hereinafter Commission Presentation on Adaptive Management]; Taylor Interview, *supra* note 248.

[334] Commission Presentation on Adaptive Management, *supra* note 333; Taylor email, *supra* note 331.

[335] MADISON MSD ADAPTIVE MANAGEMENT PLAN, *supra* note 327, at 1.

[336] *Id.* at 19. Madison MSD's second discharge point is located in the Sugar River watershed, not in the Rock River Watershed. Taylor Email, *supra* note 331.

[337] *See* MADISON MSD ADAPTIVE MANAGEMENT PLAN, *supra* note 327, at 14. Under the intergovernmental agreement, a municipality's cost for participating in the adaptive management project is equal to the total adaptive management project cost multiplied by the municipality's fraction of the total pounds of phosphorus reduction required. For example, if a municipality is responsible for reducing five percent of the total phosphorus load, then they will be assessed five percent of the total project cost. *Id.* at 67.

[338] *Id.* at 70–75. The MOU addressed evaluation, administration, financing, reporting requirements, and phosphorus reduction credit allocation. *Id.* The MOU also tasked Madison MSD with: engaging customers and the community in project development, defining and communicating expectations regarding a full-scale adaptive management project, assessing the level of community support

mentation of its pilot project, Madison MSD sought to gauge stakeholder participation as well as the technical and practical feasibility of the adaptive management concept.

Madison MSD and its partners completed a four-year pilot project in the Six Mile Creek area in the Yahara sub-watershed.[339] The three million dollar pilot program evaluated a mix of agricultural and non-agricultural practices and included ambient water quality monitoring.[340] In addition to project participants' contributions, Madison MSD and Dane County secured significant federal funding including a $1.3 million grant from the U.S. Department of Agriculture under the Mississippi River Basin Healthy Watersheds Initiative, a $1.6 million grant from the U.S. Department of Agriculture under the Regional Conservation Partnership Program ("RCPP"); and $118,000 under joint funding agreements from the U.S. Geological Survey to support water quality monitoring.[341]

During the pilot project implementation period, in anticipation of a full-scale adaptive management project, Madison MSD began to strategically extend its monitoring and BMP work beyond the pilot area.[342] With assistance from the state environmental agency, the U.S. Geological Survey, and Dane County, Madison MSD developed a water quality monitoring plan for the entire watershed. Madison MSD mapped existing monitoring stations, identified monitoring gaps, identified locations for additional monitoring stations and funded the expansion of a volunteer citizen monitoring program.[343] Madison MSD and its partners also started to fund BMPs beyond the pilot project boundaries to build relationships with crucial non-point stakeholders.[344]

During the later stage of pilot implementation, Madison MSD executed a second MOU with the state and a second intergovernmental agreement with its partners. These documents covered a full-scale project.[345] The MOU ad-

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for a full scale project, evaluating the cost, performance and ability to implement specific BMPs, evaluating the administrative aspects of working with brokers, farmers and others who may be responsible for identifying, installing or maintaining BMPs, measuring the staff time each participant dedicates to the pilot, collecting monitoring and modeling data to assess water quality impacts associated with phosphorus, nitrogen, TSS, and other parameters of interest, developing partnerships and defining roles and responsibilities for a full-scale adaptive management project, identifying ancillary benefits that may be derived from installing BMPs, and developing a strategic communication approach. *Id.*

[339] *See id.* at 8. Partners, excluding state and federal agencies, included sixteen towns and villages, five cities, three environmental nonprofits, one county, one power company, one utility company, and one farm group. *Id.* at 4–7.

[340] *Id.* at 7.

[341] Taylor email, *supra* note 331.

[342] MADISON MSD ADAPTIVE MANAGEMENT PLAN, *supra* note 327, at 14.

[343] *Id.*

[344] *Id.*

[345] *Id.* at 7.

dressed, *inter alia*, measurement of baseline load allocations, measurement of interim and final phosphorus and TSS reductions, and final compliance.[346]

As part of its full-scale project development process, Madison MSD has been working with its partners to refine the Rock River TMDL baseline loading numbers for POTWs, urban stormwater entities (MS4s) and agricultural sources. Madison MSD first refined the TMDL load values for POTWs using actual values from discharge monitoring reports. Calculating loads in this way reduced the total required phosphorus load reduction for the sub-watershed by 123,000 pounds per year, from 263,000 to 140,000 pounds. After refinement, the percent reduction required of POTWs fell from forty percent to thirteen percent, and the percent reduction required of agriculture rose from forty-five percent to sixty-five percent.[347] After refining POTW loading numbers, Madison MSD began working with its MS4 partners to develop an approach to refine baseline loading for these entities.[348] The MS4s are still updating their stormwater modeling.[349] Once the MS4s complete their updates, Madison MSD will incorporate the new baselines. Madison MSD is similarly working with partners to refine baseline agricultural loading numbers. To refine baseline agricultural loading, Madison MSD and its partners are using a modeling approach that incorporates more recent agricultural land management information than that used in TMDL modeling.[350]

The adaptive management plan primarily focuses on achieving pollutant loading reductions through the implementation of agricultural BMPs.[351] The Dane County LWCD developed a list of U.S. NRCS conservation practices that may be used as agricultural BMPs under the plan.[352] The list was devel-

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[346] *Id.* at 9. In particular, the agreement determined that actual rather than TMDL values would be used to determine each source category's baseline and that any difference between TMDL modeled values and actual values could be counted toward the percent reduction requirement for the sub-watershed. *Id.* at 73. Interim progress and final compliance will be measured by stream reach, not at the single most downstream pour point. *Id.* at 73–74. If one or more point sources drop out during the plan term, the target reduction for the plan will be adjusted. *Id.* at 72. MS4s will meet a forty percent TSS reduction requirement. *Id.* at 73. Final compliance can be demonstrated through monitoring, but if monitoring fails to demonstrate water quality criteria attainment, compliance can be measured using effluent data and watershed modeling. *Id*.

[347] *Id.* at 12.

[348] *See id.* at 38. The TMDL uses an assumed baseline value of forty percent TSS pollution control and a corresponding twenty-seven percent phosphorus control for urban stormwater entities. Taylor email, *supra* note 331.

[349] Taylor Interview, *supra* note 248.

[350] MADISON MSD ADAPTIVE MANAGEMENT PLAN, *supra* note 327, at 31.

[351] *Id.* at 36.

[352] *Id.* at 47–48, 67. The NRCS engineering and management practices considered include: waste storage facilities, conservation crop rotation, residue and tillage management, contour farming, contour buffer strips, cover crop, critical area planting, diversion, riparian forest buffer, filter strips, grade stabilization structures, grassed waterways, forage and biomass planting, roof runoff structures, stream bank and shoreline protection, nutrient management, feed management, terracing, waste treatment, vegetated treatment areas, water and TSS control, restoration and management of rare and declining

oped based on practices previously implemented in the watershed and costs and phosphorus reductions associated with each practice. Although not the focus of the plan, urban BMPs that achieve reductions in excess of baseline TMDL MS4 requirements are eligible for funding under the plan. The plan also includes examples of urban BMPs that may be funded.[353]

The plan incorporates a three-phase implementation approach rooted in HUC 12 planning areas. The first phase includes watershed evaluation, prioritization, and inventory efforts.[354] The second phase provides time for practice identification and pollutant-loading reduction quantification. The final phase covers implementation, verification, and reporting. Instead of using the aggregate loading for stream reaches as identified in the TMDL to guide planning, Madison MSD re-modeled loading and aggregated loads for uniform HUC 12 areas, providing a standardized spatial comparison and loading rate. This HUC 12 approach enables the partners to focus BMP implementation on those areas with the highest loading rates.[355] LWCD staff working with individual producers will further identify resource concerns, develop conservation plans, and assist landowners with applications for conservation planning funding from NRCS. LWCD staff will also verify installed practices once every four years, maintain records and data, and record practices using GIS software.[356]

The final adaptive management plan will achieve fifty percent of the necessary load reductions by the end of the eighth year of plan implementation and one hundred percent by the end of the seventeenth year.[357] In addition to restoring impaired stream reaches addressed in the Rock River TMDL, the adaptive management plan will also help to restore impaired streams and lakes in the Yahara River sub-watershed that are not addressed in the TMDL.[358]

The projected implementation cost for the adaptive management plan is 104 million dollars over twenty years.[359] Costs are grouped into three categories: (1) staff/operational (33%); (2) BMP implementation (62%); and (3) wa-

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habitats, and wetland restoration. *Id.* In addition to the NRCS standards, the plan identifies some novel, non-NRCS practices that may be used, including low disturbance manure injection and harvestable buffers. *Id.*

[353] *Id.* at 47. Urban BMPs could include: improved leaf collection, rain gardens, street sweeping, construction site erosion control, porous pavement, biofiltration, detention ponds, retention ponds, stream bank stabilization, and swales/ vegetative filter strips. Chemical treatment systems may also be eligible. *Id.*

[354] *Id.* at 49–50. Phase one is further divided into three steps: (1) establish load reductions for nonpoint sources; (2) prioritize nonpoint reduction areas; and (3) inventory resource concerns based on prioritized areas. *Id.*

[355] *Id.* at 50.

[356] *Id.* at 56.

[357] *Id.* at 41.

[358] *Id.* at 21.

[359] *Id.* at 67.

ter quality monitoring (5%).[360] Municipal assessments will provide forty-five million dollars, while producer cost share and funding from federal, state, and local programs will provide another fifty-eight million dollars. Participants expect the remaining costs to be covered by voluntary producer participation or additional funding from other sources.[361]

Both Madison MSD's and the group MS4 small stormwater individual permit, applicable to several of Madison MSD's MS4 partners, have expired. Madison MSD's permit expired on June 30, 2014, and did not contain a WQBEL.[362] Madison MSD submitted its adaptive management plan to the state environmental agency on December 17, 2015.[363] This was likely several years ahead of the date by which it would have been required to submit a plan under a compliance schedule included in its next permit.[364] It is unclear when the state will reissue permits for the entities participating in the adaptive management plan. Although, up to this point, the state has not coordinated the permit schedules of Madison MSD and its MS4 partners, it has an opportunity to take a coordinated permit approach when it reissues the stakeholders' permits.[365] It is also unclear how the state will incorporate the adaptive management plan into the forthcoming permits, though the state's adaptive management rules and guidance do provide some indication of additional requirements that permittees can expect to see. In accordance with state guidance and regulations, in addition to applicable POTW interim effluent limits, permits will likely incorporate requirements for in-stream and effluent monitoring, implementing adaptive

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[360] *Id.*

[361] *Id.*

[362] WIS. DEP'T OF NAT. RESOURCES, GENERAL PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM: MADISON METROPOLITAN SEWERAGE DISTRICT (2009), http://www.madsewer.org/Portals/0/Planning/FacilityPlans/SolidsHandlingPlan/Appendix%20A.pdf [https://perma.cc/MK2L-BF4C].

[363] Upon reviewing the plan, the state environmental agency stated that subject to public comment and resolution of minor plan revisions, it saw no further impediments to approval of the plan. *See* Letter from Susan Sylvester, Dir. Water Quality Bureau, Wis. Dep't of Nat. Res., to Dave Taylor, Dir. of Ecosystem Servs., Madison Metro. Sewerage Dist. (March 15, 2016), http://www.madsewer.org/Portals/0/ProgramInitiatives/YaharaWINs/Resources/Documents/DNR%20letter%20regarding%20approval%20of%20AM%20plan%2003152016.pdf [https://perma.cc/JC4Y-56NW].

[364] *See supra* notes 363–366 and accompanying text.

[365] DAVE TAYLOR, YAHARA WINS: ADAPTIVE MANAGEMENT PROJECT 4 (2014), http://www.madsewer.org/Portals/0/AboutUs/Commission/MeetingAgendas/Agenda20140130.pdf [https://perma.cc/7RCX-XMK6] (included as a report attached to Meeting Minutes, Meeting of the Comm'n of the Madison Metro. Sewerage Dist. (Jan. 16, 2014)). In 2012, Wisconsin announced its intention to synchronize permit issuance within watersheds in the state. In accordance with this approach, permits in the Yahara sub-watershed were to be reissued by June 30, 2014; however, the agency abandoned the approach and indicated that, instead, it would include a common phosphorus compliance schedule for adaptive management in all permits within relevant watersheds. *Id.*

management plan actions, and annual reporting of monitoring data and implementation actions and.[366]

2. City of Oconomowoc: Adaptive Management Plan

The Oconomowoc POTW and MS4 serve and operate in the City of Oconomowoc, which is located in the Rock River Basin.[367] The POTW treats approximately 2.4 million gallons of wastewater per day.[368] The POTW facility discharges 5,694 pounds per year, about twenty-two percent of the pollution load to the Oconomowoc River.[369] The MS4 discharges 6217.38 pounds per year of phosphorus, contributing another twenty-five percent of the pollution load to the Oconomowoc River.[370]

Instead of separately addressing the city's POTW and MS4 WQBELs through upgraded technology and urban BMPs, the City and its partners developed an adaptive management plan for the Oconomowoc River watershed, a sub-watershed of the Rock River Basin.[371] The watershed is shown below in **Figure** 25. It is approximately 83,750 acres and consists of four HUC 12 areas.[372] Land use in the watershed is: croplands and grasslands (50%); forests (16%); wetlands (13%); open water (7.5%); and developed (6%).[373] Most of the developed area in the watershed is in and near the City of Oconomowoc.[374]

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[366] WIS. ADMIN. CODE NR § 217.18(3) (2016); ADAPTIVE MANAGEMENT TECHNICAL HANDBOOK, *supra* note 105, at 76.

[367] In 2011, EPA approved the state's TMDL for phosphorus and TSS for the Rock River Basin. *See supra* notes 347–358 and accompanying text (discussing the TMDL approval process for the Madison MSD).

[368] *Frequently Asked Questions: Wastewater*, OCONOMOWOC, WIS., http://www.oconomowoc-wi.gov/faq.aspx?TID=20 [https://perma.cc/VHL8-3YQQ].

[369] Steinbach Interview, *supra* note 248.

[370] Email from Tom Steinbach, Operations Manager, City of Oconomowoc Wastewater Treatment Facility, to author (Oct. 18, 2016, 11:06 CST) [hereinafter Steinbach Email] (on file with author).

[371] RUEKERT/MIELKE, OCONOMOWOC WATERSHED PROTECTION PROGRAM 2–3, 11 (2015) [hereinafter OCONOMOWOC WATERSHED PROTECTION PROGRAM], http://dnr.wi.gov/topic/SurfaceWater/documents/AmWqt/Oconomowoc-finalsubmittal.pdf [https://perma.cc/VRM9-K4S6] (prepared by an outside consulting agency for the City of Oconomowoc). In total, excluding state and federal agencies, Oconomowoc has amassed twenty-six partners including: American Farmland Trust, Camp Whitcomb/Mason, Carmelites of Holy Hill, City of Oconomowoc MS4, Clean Water Association, Clean Wisconsin, Erin Meadows Farms, Farmer Leadership Group, Friess Lake Advancement Association, Greener Oconomowoc, Lac La Belle Lake Management District, Mid Kettle Partners, North Lake management District, Okauchee Lake Management District, Ozaukee Washington land Trust, Pabst Farms, Rock River Coalition, Ruekert/Mielke, Inc., Sand County foundation, SHE Consulting Engineers, Silver Lake Management Group, Southeastern Wisconsin Regional Planning Commission (SEWRPC), Tall Pines Conservancy, Town & Country Resource Conservation & Development, Inc. University of Wisconsin Extension, and the Village of Oconomowoc Lake. *Id.* at 5–8.

[372] *Id.* at 16.

[373] *Id.* at 21.

[374] *Id.*

The watershed contains five urban stormwater entities, in addition to Oconomowoc. However, the additional MS4s have not yet updated their storm sewer maps or modeling or determined whether they will participate in the adaptive management project.[375]

Prior to developing its adaptive management plan, Oconomowoc evaluated onsite technology options and associated costs for its POTW and evaluated aggregate costs for separate POTW and MS4 compliance approaches. The City rejected a technology-only POTW compliance approach because it would use more energy, water, and chemicals than an adaptive management approach.[376] A technology approach would require the city to add significant additional amounts of ferrous chloride, which could clog and discolor its filters; retrofit its filters to remove greater amounts of phosphorus; and possibly add supplementary filters or biological phosphorus removal.[377] Moreover, the City found that the combined cost of separate POTW and MS4 WQBEL compliance approaches would far exceed the cost of implementing a joint adaptive management approach. Specifically, the City projected that an update of plant technologies at the POTW would cost between $1.5 million and $2 million dollars, and to implement urban stormwater BMPs would cost an additional ten million dollars.[378] In contrast, the City found that the total cost to implement a ten year adaptive management program focusing on implementation of agricultural BMPs would be $3,382,835, and $713,600 of this cost had been covered by grants and corporate sponsorship to date.[379]

In developing its adaptive management plan, Oconomowoc integrated they City's ongoing RCPP and urban stormwater planning processes.[380] The City also integrated existing partner stakeholder efforts including programs to reduce known runoff problems, ameliorate stream bank erosion, restore degraded habitat, achieve energy savings, improve lake health, and preserve farmland.[381]

Oconomowoc's adaptive management plan is focused on achieving load reductions—4419 pounds of phosphorus annually—through implementation of agricultural BMPs.[382] The city conducted a comprehensive inventory of the

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[375] Steinbach Phone Interview, *supra* note 171.

[376] OCONOMOWOC WATERSHED PROTECTION PROGRAM, *supra* note 371, at 3.

[377] *Id*.

[378] *Id*. at 3, 4.

[379] *Id*. at 49–50.

[380] Oconomowoc submitted a grant proposal seeking $500,000 in funding from the NRCS RCPP, which was subsequently awarded to the City. *Id.* at 4, 49. The City received a state Urban Nonpoint Source & Stormwater Program Planning Grant to study urban stormwater quality and pollution mitigation options, and, at the same time that it was working on its adaptive management plan, it was working with experts to complete this study. Steinbach Phone Interview, *supra* note 171; *see* OCONOMOWOC WATERSHED PROTECTION PROGRAM, *supra* note 371, at 23–24.

[381] OCONOMOWOC WATERSHED PROTECTION PROGRAM, *supra* note 371, at 12, 24, 51.

[382] *Id.* at 36.

planning area and utilized GIS and modeling tools to compile a framework for achieving agricultural loading reductions. Oconomowoc's modeling shows that on average phosphorus reductions of 1.45 pounds per acre, per year are achievable in agricultural areas.[383] Through the use of orthographic maps, GIS, and existing county data, Oconomowoc, working with its agricultural planning partners, identified seventy-nine agricultural critical source areas ("CSAs") on which to implement BMPs. For each CSA, the City identified: location, acreage, and management measures.[384] After identifying CSAs and BMPs, the City further prioritized the areas taking into consideration possible reductions and costs. The city identified multiple measures for each CSA to allow the LWCD and landowners flexibility to make the final selection of measures appropriate to each area. LWCDs in three out of four counties in the planning area have agreed to provide both in kind and paid technical assistance.

In addition, Oconomowoc actively engaged producers in plan development to increase the likelihood that they would implement BMPs in the planning area. Specifically, the City helped develop the farmer-led Farmer Leadership Group, which will lead communication, coordination, and implementation efforts.[385]

Although it is focused on agricultural BMPs, the plan also sets a goal of achieving a reduction of two thousand pounds of phosphorus through implementation of a variety of urban BMPs.[386] The plan estimates that urban practices will cost one hundred dollars per pound of phosphorus removed, on average.[387] To incorporate urban BMPs, planners may pull from the City's previously completed stormwater planning study.[388] In addition to implementing agricultural and urban control measures, Oconomowoc also plans to achieve reductions through treatment upgrades, lake improvements, and streambank stabilization projects.[389]

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[383] *Id.*

[384] *See id.* at 25–32 (providing a table with this information).

[385] *Id.* at 4.

[386] *Id.* at 42. Urban BMPs may include: grass swales, detention ponds, settling basins, infiltration devices or other urban stormwater practices. *Id.*

[387] *Id.*

[388] In its Stormwater planning study, the city identified alternative pollution mitigation techniques, identified the peak flow and pollutant load reductions for each measure, and determined costs. The City analyzed three basins in its urban area. The basins range from 160 acres to 235 acres in size. Within these basins, the City analyzed pollutant loading reduction potential of ponds and a road reconstruction project. The City also analyzed a suite of small on-site treatment measures that could be implemented in each basin including: underground storage, bio-retention basins, infiltration bays/trenches, curb extensions, permeable pavement, street narrowing, rain barrels, rain gardens, Stormwater ponds, and infiltration basins. *See id.* app. B at 3–12.

[389] *Id.* at 50–52. Specifically, the plan states that by adding forty gallons per day of additional ferrous chloride to the treatment process at the Oconomowoc POTW the facility can meet its interim permit limits and achieve a two thousand five hundred pound overall phosphorus reduction, a one thousand pound phosphorus reduction could be achieved through lake improvements, and approxi-

The state reissued Oconomowoc's POTW permit in March of 2014, and Oconomowoc submitted its adaptive management plan in December of 2015. Oconomowoc's current POTW permit includes WQBELs that range from 0.17 mg/L in August and September to 0.30 mg/L in February. The City anticipates an effective limit of 0.12 mg/L.[390] Under the current permit, the City must be in compliance with its WQBELs by April 1, 2022. Oconomowoc's MS4 is currently covered under the state's small MS4 general permit, which expires on April 30, 2019. Moving forward, at the request of the City, the state plans to reissue a revised POTW permit and issue a new individual MS4permit. The state also plans to coordinate the permit compliance schedules and effective dates.[391] Although the content of the future permits has yet to be determined, as mentioned previously, the state's adaptive management guidance and regulations provide some insight into the adaptive management related provisions that may be incorporated into forthcoming permits.[392]

3. Green Bay MSD: Adaptive Management Pilot Project

Green Bay MSD operates two wastewater treatment facilities in the Lower Fox River basin. The POTW serves seventeen municipalities over a 285 square mile area. Its two facilities treat an average of forty million gallons per day of influent. In total, Green Bay MSD discharges 31,624 pounds of phosphorus per year into the Lower Fox River and represents less than two to three percent of the total phosphorus entering Green Bay.[393]

As discussed previously, in 2012, EPA approved Wisconsin's TMDL for phosphorous and TSS for the Lower Fox River Basin and Lower Green Bay.[394] Point sources in the TMDL area include twenty industrial wastewater treatment facilities, fourteen POTWs, twenty-nine urban stormwater permittees, and fifteen CAFOs.[395] As shown by **Figure** 27, land use in the area is urban regulated (25.9%), urban non-regulated (8.7%), construction sites (0.6%), natural areas (14.7%), and agricultural areas (50.2%).[396]

Figure 26. Land Use in the Lower Fox River Basin.[397]

Figure 27. Land use in the Lower Fox River Basin.[398]

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mately seventy-five pounds of phosphorus per one thousand feet of channel could be removed through streambank stabilization.

[390] *Id.* at 1.

[391] Email from Bryan Hartsook, Water Res. Eng'r, Wis. Dep't of Nat. Res., to author (Jun. 28, 2016, 14:34 CST) [hereinafter Hartsook June 28 email] (on file with author).

[392] *See supra* notes 363–366 and accompanying text (discussing future permit in Madison MSD case study).

[393] Hafs Interview, *supra* note 278.

[394] *See supra* notes 165–185 and accompanying text.

[395] LOWER FOX AND LOWER GREEN BAY TMDL, *supra* note 165, at 27.

[396] *Id.* at 8.

[397] *Id.* at 9.

To investigate the feasibility of a full-scale adaptive management project, Green Bay MSD is working with partners to implement an adaptive management pilot project in the Silver Creek watershed, a sub-watershed in the Duck Creek watershed in the Lower Fox River Basin. Silver Creek is approximately fifteen miles in length, and the pilot project covers 4800 acres that drain to the waterbody.[399] The makeup of land use in the Silver Creek sub-watershed is representative of the majority of sub-watersheds in the Lower Fox River TMDL area. Approximately half of the acres in Silver Creek are agricultural. The remainder of land use in the sub-watershed is forest (12.2%); grassland (.3%); pasture (22.2%); urban (10.5%); water (1.3%), and wetlands (5.7%).[400] The sub-watershed contains 124 crop fields, approximately half of which the Oneida Tribe owns.[401]

Economic considerations weighed heavily in Green Bay MSD's decision to invest substantial resources in an adaptive management pilot project. To meet its WQBEL of 0.2 mg/L through facility upgrades, Green Bay MSD estimates that it would need to build a new facility at a cost of more than $220 million.[402] In addition to evaluating its own technology upgrade costs, Green Bay MSD also worked with four other POTWs and the Fox Wolf Watershed Alliance ("FWWA") to evaluate the economics of a multiple POTW adaptive management project in the Lower Fox basin.[403] The stakeholders found that

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[398] *Id.* at 8.

[399] *Id.* at 4. Excluding state and federal agencies, Green Bay MSD is working with several partners to implement its pilot project: the Oneida Nation of Wisconsin, Brown and Outagamie County Land and Water Conservation Departments, agricultural consulting groups, the University of Wisconsin Green Bay, Ducks Unlimited, and The Nature Conservancy. SILVER CREEK SEMI-ANNUAL REPORT, *supra* note 285, at 6.

[400] Hafs Interview, *supra* note 278.

[401] *Id.*

[402] SILVER CREEK SEMI-ANNUAL REPORT, *supra* note 285, at 5; Bill Hafs, Dir. of Envtl. Programs, NEW Water, Green Bay Metro. Sewerage Dist., Presentation to Illinois Association of Wastewater Agencies: Planning and Implementing an Adaptive Management Project: Lower Fox River Basin—Green Bay (Jan. 8, 2016). Green Bay MSD's permit states its WQBEL in pounds instead of as a concentration. The pound limit stated in the permit equates to about 0.20 mg/L depending on the amount of flow in a given period. Email from Jeff Smudde, Watershed Programs Manager, NEW Water, to author (May 17, 2016, 12:56 CST) (on file with author).

[403] FWWA is an independent, non-profit organization that identifies issues and actions to protect, restore, and sustain water resources within the Fox-Wolf Basin. *See Mission and Vision*, FOX WOLF WATERSHED ALLIANCE, https://fwwa.org/our-work/about-us/mission-and-vision/ [https://perma.cc/W6MH-FK9R]. The FWWA Board of Directors is comprised of stakeholders located within the Fox-Wolf Basin, including representatives from municipal/industrial wastewater, municipal stormwater, cropland/livestock producers, county conservationists, tribal nations, and universities. *See id.* In order to analyze and compare a multiple POTW adaptive management project in the Lower Fox River Basin with a scenario in which point sources individually achieve compliance through a traditional technology approach, the FWWA developed estimates for technology compliance costs for four large POTWs in addition to Green Bay MSD in the Lower Fox Basin. Nick Vande Hey, McMahon Eng'rs., *Adaptive Management in the Lower Fox River Basin* 31, 59–65 (Fox Wolf Water Shed Alliance, 2014) (on file with author). FWWA estimates that utilizing a technology compliance approach, aggre-

utilizing a technology compliance approach would cost $399 per pound of phosphorus reduced. In contrast, under the adaptive management project scenarios studied, the stakeholders found that phosphorus reduction would cost $24 to $111 per pound of phosphorus reduced and the total costs for implementation of all necessary BMPs would be between $135.5 million and $517 million, which could be proportionally distributed among participating POTWs.[404]

Green Bay MSD's pilot project primarily focuses on achieving load reductions through the implementation of agricultural BMPs. Green Bay MSD compiled a list of practices to be installed during the pilot project.[405] On average, for the watershed, Green Bay MSD estimates that conservation practices can reduce phosphorus loading from agricultural lands by 1.2 pounds per acre.[406] The pilot aims to reduce phosphorus loads from the twenty-four hundred agricultural acres in Silver Creek by two thousand pounds per year.[407]

Green Bay MSD is in its second year of its five-year project. In March of 2015, Green Bay MSD completed soil sampling to help identify baselines and priority areas for BMP implementation. Green Bay MSD received permission to sample 123 of 124 fields in the watershed and utilized a 2.5-acre grid.[408] Green Bay MSD flagged areas with phosphorus levels greater than fifty parts per million as priority areas for BMP implementation.[409] **Figure** 31 shows soil test results for a small portion of the planning area. Between April and Sep-

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gate capital costs for the four facilities to comply with a .3 mg/L permit limit would be $4.7, with $37.5 million in associated operation and maintenance costs. *Id.* To comply with a .1 mg/L limit, FWWA estimates that aggregate capital costs would be $326.1 million, with $447.9 million in associated operation and maintenance costs. *Id.* It is not clear that any of the facilities would actually have to meet a .1 mg/L WQBEL. *See id.* As such, technology costs for phosphorus removal likely lie somewhere between the cost estimates. *Id.* FWWA also evaluated compliance costs for urban Stormwater entities and industrial wastewater treatment facilities in the Lower Fox River Basin. *Id.* FWWA estimates that urban Stormwater entities could face aggregate compliance costs of $200 to $400 million and aggregate compliance costs for industrial wastewater treatment facilities could exceed $200 million. *Id.*

[404] *Id.*

[405] Practices include: grassed waterways, buffers, critical area planting, water and sediment control basins, tile drainage treatment systems, stream bank repair, harvestable contour strips, terracing, diversions, stream crossing repair, wetland restoration, vegetated water treatment system, field conversion to conservation, livestock exclusion, conversion of cropland to permanent grass/ grazing, crop rotation modification, crop residue, cover crops or inter-seeding, companion crops, nutrient placement, and tillage practice changes, split rearrange fields, contour strip cropping, precision application and variable rate technology, soil amendment, and phosphorus reduction practices.

[406] Email from Bill Hafs, Dir. of Envtl. Programs, Green Bay Metro. Sewerage Dist., to author (May 17, 2016, 11:27 CST) [hereinafter Hafs Email] (on file with author).

[407] Hafs & Smudde Interview, *supra* note 285.

[408] In total, Green Bay MSD collected 960 baseline samples.

[409] Green Bay MSD found concentrations as high as five hundred ppm in several samples, and twenty-six percent of samples had phosphorus concentrations of fifty ppm or higher. SILVER CREEK SEMI-ANNUAL REPORT, *supra* note 285, at 11.

tember of 2015, LWCD staff, private agronomists, NRCS, and Oneida Environmental staff completed more than one hundred field walks to identify and map BMP implementation opportunities, document existing BMPs, and discuss enhancement of existing nutrient management plans with producers.

Figure 31. Green Bay MSD's Phosphorus soil sampling results.[410]

After aggregating inventory data Green Bay MSD worked with producers to integrate the information into conservation plans. The facility integrated nutrient management strategies with BMP implementation plans. Approximately eighty percent of farmers found the plans satisfactory and agreed to apply for NRCS conservation funding. In total, Green Bay MSD will work with county LWCD staff and Oneida Nation representatives in 2016 and 2017 to install between five hundred and seven hundred conservation practices on one hundred fields—an average of five to seven conservation practices per field.[411] The Oneida tribe has agreed to implement practices on all of their approximately 850 acres of agricultural land in the pilot area.

Green Bay MSD's pilot project includes both monitoring and modeling efforts. Green Bay MSD has five water quality monitoring sites and utilizes one USGS gaging station. In its first year, Green Bay MSD collected a total of seventy-five water samples and analyzed them for TSS, total phosphorus, and dissolved phosphorus.[412] Green Bay MSD has also developed a project specific Soil and Water Assessment Tool model.[413]

In addition to implementing agricultural BMPs, Green Bay MSD will be working on several additional innovative phosphorus reduction projects. First, Green Bay MSD will partner with Ducks Unlimited and the U.S. Fish and Wildlife Service on several wetland projects aiming to identify and restore ten to twenty acres of wetlands and monitor the pollution reductions achieved.[414] Second, Green Bay MSD will convert more than fifty acres of fields with relatively high phosphorus concentration to managed grazing to reduce sediment loading by over ninety-five percent and phosphorus loading by over eighty percent. As part of the managed grazing effort, Green Bay MSD will also re-

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[410] Map courtesy of Jeff Smudde, Watershed Programs Manager, NEW Water. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[411] SILVER CREEK SEMI-ANNUAL REPORT, *supra* note 285, at 17; Hafs Interview, *supra* note 278.

[412] SILVER CREEK SEMI-ANNUAL REPORT, *supra* note 285, at 11.

[413] To develop its model, Green Bay MSD divided the Silver Creek watershed into sub-basins and further divided sub-basins into Hydrologic Response Units ("HRUs"). HRUs represent actual field boundaries and any remaining open spaces. Model outputs will include: amount of surface runoff generated, water, sediment and phosphorus yield from HRUs by day, month or year, instream water quality, and phosphorus and TSS reduction by implementation scenario. *Id.* at 17.

[414] *Id.* at 18.

store 0.75 miles of riparian corridor.[415] Third, Green Bay MSD will evaluate pollutant removal potential of harvestable vegetated buffers.[416]

The estimated cost of the pilot project is $3.42 million over five years.[417] This figure excludes the substantial NRCS Environmental Quality Incentives Program cost share dollars that producers are expected to receive.[418] Green Bay MSD is contributing approximately $400,000 per year to the project.[419] Because Green Bay MSD is taking an intersectional approach to its watershed-based plan—prioritizing soil conservation, wetland restoration and habitat improvement in addition to water quality—it has positioned itself to receive grants from diverse sources. For instance, Green Bay MSD has received $100,000 from the Fund for Lake Michigan (wetland restoration), $140,000 from Ducks Unlimited (wetland restoration), $100,000 from the Natural Resource Damage Assessment Fund, and $1.68 million from the EPA Great Lakes Restoration Initiative.[420]

Green Bay MSD is also looking ahead beyond its pilot and working to create a repeatable and scalable watershed planning framework that includes nutrient management and conservation planning, predictive water quality modeling, and monitoring.[421] Green Bay MSD has developed a conservation plan template, which includes a detailed site map, photographs, existing practices, recommended BMPs with priority ranking and comments, BMP cost share information, acceptance and implementation concurrence, cost and performance, and an enhanced nutrient management plan summary worksheet.[422] Green Bay MSD also updated nutrient management models to incorporate soil-sampling data.[423]

On July 1, 2014, the state reissued Green Bay MSD's permit with a phosphorus WQBEL. Green Bay MSD's phosphorus WQBEL is 203 pounds per day, as a monthly average, and sixty-eight pounds per day, as a six-month average.[424] The pound limits stated in the permit equate to a combined concentra-

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[415] *Id.* at 17.

[416] *Id.* at 19.

[417] Hafs & Smudde Interview, *supra* note 285.

[418] *Id.* Producers have applied for cost share dollars to support approximately eighty percent of the practices being implemented. *Id.*

[419] *Id.*

[420] *Id.* A Natural Resource Damage Assessment ("NRDA") of the Fox River and Green Bay identified companies that were historically responsible for the release of PCBs into the Fox River. Several of these companies have made agreements, through the NRDA process, to fund natural resource restoration projects in the Fox River Valley and surrounding areas. *Lower Fox River/Green Bay: Natural Resource Damage Assessment and Restoration* U.S. FISH & WILDLIFE SERV. (July 29, 2016), https://www.fws.gov/midwest/es/ec/nrda/foxrivernrda/index.html [https://perma.cc/4MRZ-WUA8].

[421] SILVER CREEK SEMI-ANNUAL REPORT, *supra* note 285, at 11.

[422] *Id.* at 10.

[423] *Id.* at 16.

[424] GREEN BAY METROPOLITAN SEWERAGE DISTRICT DISCHARGE PERMIT, *supra* note 237.

tion limit of approximately 0.20 mg/L for both of Green Bay MSD's facilities.[425] Under its current permit, Green Bay MSD is required to indicate by March 31, 2018, whether it will utilize adaptive management, trading or technology upgrades to meet its WQBEL, and achieve compliance with its WQBEL by June 30, 2023.[426]

4. Milwaukee MSD: Green Infrastructure Plan

Milwaukee MSD is a POTW operating two treatment facilities in the Milwaukee River basin.[427] The facility serves twenty-eight communities over a 411 square mile area, and its treatment capacity is 630 million gallons per day. Milwaukee MSD's sewer system is ninety-four percent separate and six percent combined.[428]

As a condition of its permit, Milwaukee MSD developed a TMDL for phosphorus, bacteria, and TSS for the Milwaukee River basin. The basin covers approximately 1127 square miles and contains approximately 1010 miles of streams, the Milwaukee Harbor Estuary, and the near shore Lake Michigan area. As of 2000, sixty-seven percent of land use in the Milwaukee River basin was rural, thirty-three percent was urban, and nearly half of urban land was residential.[429] The Menomonee, Milwaukee, Kinnickinnic, Root, and Oak Creek watersheds together comprise the basin.[430] As shown by Figure 33 below, the Milwaukee MSD service area contains parts of each of these sub-watersheds. The TMDL addresses impaired segments in the Menomonee, Milwaukee, and Kinnickinnic Rivers, and the Milwaukee River Estuary.[431] The state issued the draft TMDL prepared by Milwaukee MSD on July 21, 2016.[432]

To date, Milwaukee MSD has spent approximately four billion dollars on grey infrastructure.[433] After many years of grey infrastructure pollution control efforts, Milwaukee MSD developed its watershed permit compliance approach

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[425] Hafs & Smudde Interview, *supra* note 285.

[426] GREEN BAY METROPOLITAN SEWERAGE DISTRICT DISCHARGE PERMIT, *supra* note 237.

[427] MILWAUKEE WATERSHED WATER QUALITY PLAN, *supra* note 190, at 11, 21.

[428] Interview with Kevin Shafer, Exec. Dir., Milwaukee Metro. Sewerage Dist., in Milwaukee, Wis. (Jun. 6, 2016) [hereinafter Shafer Interview].

[429] *Id.*

[430] MILWAUKEE METRO. SEWERAGE DIST., REGULATIONS, CH. 13, MAPS OF DISTRICT JURISDICTIONAL WATERCOURSES, http://www.mmsd.com/rulesandregs/rules [https://perma.cc/RJ4V-567H].

[431] WIS. DEP'T OF NAT. RESOURCES, WI-0036820-03-1, GENERAL PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM, § 4.9 (2014), http://www.mmsd.com/-/media/MMSD/Documents/Wastewater%20Treatment/2013_Discharge_Permit_As_Modified_12112014.pdf [https://perma.cc/5R22-CU24].

[432] *See Milwaukee Basin*, WIS. DEP'T OF NAT. RES., http://dnr.wi.gov/topic/TMDLs/Milwaukee/ [https://perma.cc/EUN2-QUXQ].

[433] MILWAUKEE METRO. SEWERAGE DIST., *History*, http://www.mmsd.com/about/history [https://perma.cc/S8M8-YK6W].

to address the two to three overflows per year that it was still experiencing and to dramatically reduce nutrient and TSS pollutant loading to impaired waterbodies. [434] A main component of Milwaukee MSD's watershed approach is its green infrastructure plan, which builds upon the facility's previous watershed planning and programming efforts. [435]

Prior to developing its green infrastructure plan, Milwaukee MSD analyzed both grey and green infrastructure options. Milwaukee MSD found additional grey infrastructure to be a limited solution because it was not cost effec-

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[434] Prior to 1994, Milwaukee MSD had considerable challenges with both separate sewer system overflows ("SSOs") and combined system overflows ("CSOs"). On average, Milwaukee MSD experienced approximately fifty to sixty overflows per year. After lawsuits in 1977 and 1978, Milwaukee MSD developed and carried out infrastructure plans focused on water pollution abatement and overflow reduction. *History*, MILWAUKEE METRO. SEWERAGE DIST., https://www.mmsd.com/about-us/history [https://perma.cc/E3X3-HGWA]. In 1994, Milwaukee MSD's Inline Storage System ("ISS"), the cornerstone of Milwaukee MSD's pollution abatement program, became operational. Costing nearly one billion dollars, the ISS is a tunnel storage system buried 28.5 miles deep and located 300 feet below ground. Sections of the ISS are up to thirty-two feet in diameter. During peak flows, the ISS temporarily holds up to 521 million gallons of wastewater until one of Milwaukee MSD's two treatment facilities has sufficient treatment capacity. Since the ISS became operational, Milwaukee MSD experiences an average of 2.3 CSOs per year and, on average, one SSO per year during wet weather and one SSO approximately every three years during dry weather. Shafer Interview, *supra* note 428; MILWAUKEE METRO. SEWERAGE DIST., SEWER: SUSTAINABLE WATER RECLAMATION 20 (2012) [hereinafter SUSTAINABLE WATER RECLAMATION], https://www.mmsd.com/application/files/9314/8416/1452/Sustainability_Plan.pdf [https://perma.cc/76RH-7G7L]. Despite Milwaukee MSD's progress in reducing CSOs and SSOs, in 2002, the state of Wisconsin sued the POTW alleging that the facility had experienced at least eight SSO events since 1994. Rather than engage in protracted litigation, Milwaukee MSD and the state entered into a stipulation agreement, which required Milwaukee MSD to establish a "long-term corrective action program for future water pollution abatement construction projects." Stipulation and Order at 1, State v. Milwaukee Metro. Sewerage Dist., No. 02-CV-2701 (Wis. Cir. Ct. Milwaukee Cty. May 29, 2002). Milwaukee MSD has since completed the infrastructure projects required under the stipulation. *Id.* at 2.

[435] There are several examples of Milwaukee MSD's watershed planning efforts. In the development of its 2020 Facilities Plan, Milwaukee MSD took a watershed-based approach and collaborated with the regional planning agency, which was simultaneously conducting an update of its areawide regional water quality management plan. *See supra* note 265. Milwaukee MSD has also completed a third party TMDL for areas in the Milwaukee River basin. SUSTAINABLE WATER RECLAMATION, *supra* note 434, at 21, 34–35. Milwaukee MSD's Private Property Inflow & Infiltration program reimburses costs for upgrades and improved Stormwater management. It helps private landowners disconnect from the Stormwater system and use green infrastructure to absorb clear water from disconnected sources. Milwaukee MSD's Greenseams program permanently protects lands critical to protecting water quality through voluntary purchases. To date, almost 2300 acres have been protected through this program. Milwaukee MSD's Green Infrastructure Partnership program uses an annual RFP process to provide matching funds for green infrastructure projects. Milwaukee MSD's Rain Barrel Program recycles fifty-five gallon drums from local food businesses and retrofits them for stormwater capture. Milwaukee MSD's Regional Green Roof Initiative awards grants to encourage building owners to install green roofs. To date, 9 acres of green roofs have been funded. MILWAUKEE METRO. SEWERAGE DIST., REG'L GREEN INFRASTRUCTURE PLAN 21 (2013) [hereinafter REG'L GREEN INFRASTRUCTURE PLAN], http://www.freshcoast740.com/gi-plan [https://perma.cc/G3UY-DUQJ] (a PDF copy of the plan is available for download on the website by clicking the link titled, "Full Document"); SUSTAINABLE WATER RECLAMATION, *supra* note 434, at 13, 19, 29.

tive and could not help to achieve phosphorus and TSS pollutant load reductions needed to address impaired waterbodies within the Milwaukee River Basin. In evaluating the benefits of a green infrastructure plan, Milwaukee MSD utilized a triple bottom line approach that considered economic, environmental, and social benefits of a green infrastructure approach. In the economic category, Milwaukee MSD identified forty-four million dollars in infrastructure savings, 500 green maintenance jobs at full implementation, 160 annual construction jobs, and $667 million in increased property value.[436] In the environmental category, Milwaukee MSD identified 4 billion gallons per year in groundwater recharge, 73,000 tons of carbon capture (equivalent to emissions from 14,000 vehicles), energy cost savings of $1.5 to $2.1 million per year, and reduced carbon monoxide, nitrogen dioxide, ozone, particulate matter and sulfur dioxide emissions leading to improved health and $9.1 million in annual health care savings.[437] In the social benefits category, Milwaukee MSD identified improved aesthetics, lower crime rates, reduced stress, and increased opportunity for recreation.[438]

While other green infrastructure plans have focused only on addressing stormwater quantity in combined sewer areas, Milwaukee MSD's plan incorporates the separate sewer system area and addresses water quality as well as quantity. Through plan implementation, Milwaukee MSD aims to capture the first half-inch of rainfall on impervious surfaces in the 263,000 acre planning area, or a total of 740 million gallons, each time it rains. Annual reductions in flow to the facility's deep tunnel system within the combined sewer area are expected to be approximately sixty-six percent.[439] In addition, the green infrastructure plan will reduce stormwater flows to the separate sewer and combined systems by 14.8 billion gallons with annual reductions of up to fifteen million pounds of total suspended solids and 54,000 pounds of total phosphorus.[440] Potential phosphorus reductions from green infrastructure implementation are shown in **Figure** 37.[441]

Milwaukee MSD plans to work with its customer communities to implement green infrastructure on 42,000 of the 107,000 acres identified as having green infrastructure potential.[442] The green infrastructure plan incorporates a

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[436] SUSTAINABLE WATER RECLAMATION, *supra* note 434, at 54.

[437] *Id.* at 10.

[438] *Id*.

[439] *See id.* at 56.

[440] *Id.* at 10.

[441] *Id.* app. at A-7. at Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[442] To identify green infrastructure potential and target implementation, Milwaukee MSD evaluated constraints to green infrastructure including: slopes greater than twelve percent, depth to groundwater, shallow depth to bedrock, high density areas, and set backs of less than fifteen feet. The district

portfolio of green infrastructure practices and outlines the amount of each type of practice required throughout the watershed, including a breakdown of public and private land uses.[443] In addition, for each sub-watershed in the planning area, the green infrastructure plan provides important planning information for municipal stormwater entities including percent imperviousness, types of land use, recommended practice prioritization, and costs.[444]

Figure 39. Type and quantities of green infrastructure to be implemented under the green infrastructure plan.[445]

Figure 40. Water quantity storage provided by green infrastructure in the Milwaukee MSD green infrastructure plan.[446]

Figure 41. Public and private land on which green infrastructure practices will be implemented under Milwaukee MSD green infrastructure plan.[447]

Milwaukee MSD projects that full implementation of the green infrastructure plan will cost $1.3 billion. Milwaukee MSD estimates $59 million in annual capital expenditures with additional operation and maintenance costs of $10.4 million per year.[448] By incorporating green infrastructure incrementally, instead of as stand-alone or retrofit projects, Milwaukee MSD projects that it can achieve a cost savings of forty percent.[449] The average incremental cost per gallon for implementing the portfolio of strategies in the green infrastructure plan is $1.76. According to Milwaukee MSD, green infrastructure implementation will cost $0.66 less per gallon than adding deep tunnel storage.[450]

Figure 42. Incremental capital cost per gallon of storage for green infrastructure practices.[451]

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identified constraints on nine percent of identified impervious areas and did not target those areas for practice implementation. REG'L GREEN INFRASTRUCTURE PLAN, *supra* note 435, at 37–38.

[443] *Id.* at 39. Recommended green infrastructure practices include: green roofs, porous pavement, green alleys, streets, and parking lots, rain gardens and soil amendments, wetlands, rainwater catchment, native landscaping, bioretention, bioswales, greenways, and stormwater trees. *Id.* at 40.

[444] *See id.* at 8.

[445] *Id.* app. at 38. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[446] REG'L GREEN INFRASTRUCTURE PLAN, *supra* note 435, at 38. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[447] REG'L GREEN INFRASTRUCTURE PLAN, *supra* note 435, at 38. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

[448] REG'L GREEN INFRASTRUCTURE PLAN, *supra* note 435, at 11.

[449] *Id*.

[450] *Id.* at 10–11.

[451] *Id.* at 10. Illustrative images provided by the author can be viewed online at: http://bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/EALR/44_2/konopacky_graphics_A1b.pdf [https://perma.cc/3V3Y-89HL].

The state issued Milwaukee MSD's current permit on January 8, 2013. The permit includes a phosphorus WQBEL of 0.22 mg/L.[452] It is possible that Milwaukee MSD's phosphorus WQBEL may be amended after the Milwaukee River basin TMDL is approved. Under its current permit, Milwaukee MSD must achieve compliance with its WQBEL by July 31, 2022.[453] Milwaukee MSD's current permit also requires that the facility continue its watershed planning and programming efforts.

The state and Milwaukee MSD are discussing the format of the next iteration of Milwaukee MSD's permit and possible coordination with MS4s located in the green infrastructure planning area. Future permits for POTWs and MS4s may include an expanded discussion of the plan and its potential use in facilitating WQBEL compliance.

5. Menomonee River Watershed Group MS4 Individual Permit

The Cities of Brookfield, Greenfield, Milwaukee, West Allis, and Wauwatosa, the Villages of Butler, Elm Grove, Germantown, Menomonee Falls, and West Milwaukee, and Milwaukee county are the owners and operators of MS4s and the co-permittees covered under the Menomonee River watershed group small MS4 individual permit.[454] Instead of achieving permit compliance individually through implementation of urban BMPs within their jurisdictions, the co-permittees are working together, with partners, to implement targeted projects in the Menomonee River watershed.[455] The eleven municipalities cov-

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[452] MILWAUKEE METRO SEWERAGE DISTRICT PERMIT, *supra* note 237, at 20.

[453] *Id.* at 61.

[454] WIS. DEP'T OF NAT. RESOURCES, GENERAL PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM 1 (2012) [hereinafter MENOMONEE RIVER WATERSHED PERMIT], http://www.village.germantown.wi.us/DocumentCenter/View/99 [https://perma.cc/T5K7-7LJ9].

[455] Interview with Bryan Hartsook, Water Res. Eng'r, Wis. Dep't of Nat. Resources, in Wauwatosa Wis. (Jun. 9, 2016) [hereinafter Hartsook Interview]. In addition to the eleven municipalities covered under the Menomonee group MS4 individual permit, other municipalities, the Southeastern Wisconsin Watersheds Trust, "Sweet Water," Midwest Environmental Advocates, 1,000 Friends of Wisconsin, the Milwaukee Metropolitan Sewerage District, the Southeastern Wisconsin Regional Planning Commission ("SEWRPC"), EPA and the state environmental agency collaborated to develop the Menomonee River Watershed-Based Permit. Nonprofits, 1,000 Friends of Wisconsin and Sweet Water, provided outreach to elected leadership and coordinated information and education activities. Nonprofit Midwest Environmental Advocates provided legal counsel on permit conditions and the implications of municipalities with boundaries and discharges within more than one watershed. Permittees and municipalities not covered under the individual group MS4 permit provided input throughout the process. SE. WIS. REG'L WATERSHED PLANNING COMM'N, DEVELOPMENT OF A FRAMEWORK FOR A WATERSHED-BASED MUNICIPAL STORMWATER PERMIT FOR THE MENOMONEE RIVER WATERSHED 4–5 (2013) [hereinafter MENOMONEE RIVER FRAMEWORK], http://www.sewrpc.org/SEWRPCFiles/Publications/mr/mr-204-framework-for-stormwater-permit-men-river-wshed.pdf [https://perma.cc/HY7D-WWZF].

er approximately eighty percent of the 136 square mile watershed.[456] Land use in the Menomonee watershed is largely urban (64%) but includes a sizable agricultural footprint (17%), as well as grasslands, forestlands, and wetland areas (remainder).[457] As mentioned previously, Milwaukee MSD has developed a TMDL for the Milwaukee River Basin, which includes the Menomonee River watershed.[458]

The permittees did not formally evaluate their individual compliance costs prior to applying for and receiving the watershed based permit. Nonetheless, stakeholders that worked with the permittees to develop the watershed permit framework, discussed below, project significant cost savings from the use of a watershed compliance approach that incorporates BMP targeting, eliminates the use of trade ratios, and creates potentially greater grant funding opportunities.[459]

The group MS4 individual permitting process is not new to the MS4s in the Menomonee River watershed. Prior to the development of the current permit, eight of the eleven permittees were already participating in a group MS4 individual permit under which they agreed to work together on public education and outreach, stormwater monitoring, and illicit discharge notification.[460] However, the current permit is novel because it incorporates a watershed project requirement and gives permittees the option of jointly executing the watershed project requirement.[461]

The process for transitioning from the more traditional group MS4 individual permit to the watershed group MS4 individual permit began in April of 2011, when EPA Region 5 awarded Milwaukee MSD a Water Quality Cooper-

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[456] Email from Bryan Hartsook, Water Resources Eng'r, Wis. Dep't of Nat. Resources, to author (Oct. 20, 2016, 11:59 CST) (on file with author).

[457] MENOMONEE RIVER WATERSHED PERMIT, *supra* note 454, at 2.

[458] *See Milwaukee Basin*, *supra* note 432.

[459] MENOMONEE RIVER FRAMEWORK, *supra* note 455, at 395. Trade ratios account for the uncertainty inherent in obtaining pollutant reductions from another source. Wisconsin applies trade ratios when a permittee seeks to use pollutant reductions obtained from another entity for permit compliance, unless the entities are participating in an adaptive management project. In Wisconsin, trade ratios must take into account the following uncertainties, as applicable: delivery, downstream generation, equivalency, modeling, and habitat adjustment. A trade ratio of 2:1 means that every two pounds of load reduction equals one pound of credit. WISCONSIN WATER QUALITY TRADING HOW TO, *supra* note 100, at 13–14. Application of trade ratios reduces the amount of pollution reduction credits that a credit user can claim for a given number of pounds of pollutant reduced and, thereby, increase the cost of compliance. Because the group MS4 individual permit treats all of the co-permittees as one source, a trade ratio is unnecessary and co-permittees can transfer pollutant reduction credits among themselves without increasing the cost of compliance. *See id.* at 8.

[460] MENOMONEE RIVER FRAMEWORK, *supra* note 455, at 143.

[461] *Id.* at 351. In addition to providing context and explanation regarding the new watershed project requirement, the permit fact sheet includes a link to a watershed project list compiled by stakeholder NGOs, and a matrix planning tool to assist permittees in prioritizing project ideas. *Id.* at 257.

ative Agreement grant to develop a watershed permit framework.[462] Milwaukee MSD contracted with the regional planning commission to carry out the work. The goal of the framework development process was to develop a "replicable framework for a watershed-based permit that could be applied elsewhere in the State of Wisconsin and perhaps in other states . . . ."[463] At the time the permittees and other entities were invited to participate in the framework development, their existing permit was up for reissuance and Milwaukee MSD had begun developing its TMDL for the Milwaukee River basin.[464] Desiring to continue their collaboration and prepare in advance for forthcoming, and potentially more stringent, WQBEL requirements,[465] the permittees decided to participate in the development of the framework and also to implement the framework by applying for a watershed-based permit.[466]

In developing the permit, permittees and the drafter recognized that time constraints would not permit them to identify specific watershed-based projects in the permit. To address this challenge, they developed and incorporated a project proposal process into the permit.[467] They also incorporated language referencing existing watershed plans to encourage coordination with other relevant planning processes.[468]

After permit issuance, the permittees carried out a successful request for proposals to identify potential green infrastructure projects that could be utilized for permit compliance. The request for proposals was open to all interested stakeholders and project proposal selection criteria prioritized projects that aimed to implement recommendations from existing watershed plans.[469] Permittees, two nonprofits, the county parks department, and an individual county submitted proposals including two river bank stabilization projects, a human bacteria monitoring project, a parkway reconstruction project, a private com-

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[462] *Id*. In total, the joint process to develop the framework and permit took 18 months. Hartsook Interview, *supra* note 455.

[463] MENOMONEE RIVER FRAMEWORK 5, *supra* note 455, at 5.

[464] Hartsook Interview, *supra* note 455.

[465] *Id.*

[466] *Id.*

[467] *Id.*

[468] *See* MENOMONEE RIVER WATERSHED PERMIT, *supra* note 454, at 21.

[469] The call for proposals states:

> [T]here are a number of existing planning documents that identify, and some prioritize, pollutant stressors or sources of water quality problems in the watershed, including the framework document developed for this permit by SEWRPC (Memorandum Report No. 204), SWWT's Menomonee River Implementation Plan, Madison MSD's Regional Green Infrastructure Plan, and the future Milwaukee River TMDL Implementation plan. The best proposals will make use of the data inventory and recommendations made under these planning efforts.

Meeting Minutes, Meeting of the Menomonee River Watershed-Based Permit Partners (May 21, 2014) (on file with author).

mercial green infrastructure retrofitting project, and a project researching green infrastructure maintenance.[470]

Two sub-groups of permittees have chosen to implement two different watershed-based projects.[471] The first group of permittees decided to implement a Menomonee River bank stabilization project.[472] The project will fund 500 feet of bank stabilization, and permittees estimate that they will reduce 22.5 tons per year of sediment loading from bank erosion.[473] The Fund for Lake Michigan will provide $80,000 with a $70,000/ $10,000 funding and in-kind match from municipalities.[474] The second group of permittees is working with the Milwaukee County Department of Parks, Recreation and Culture on a Parkway project.[475] The projected cost for reconstructing a 4.6-mile stretch of the parkway is $6.9 million.[476] The project will include: a constructed wetland ($350,000); 6900 square feet of rain gardens ($138,000); 126,000 square feet of bioswales ($1,260,000); and forty-four stormwater trees ($22,000). Of this total project, permittees received state approval to obtain credit for constructing five rain gardens totaling approximately four thousand square feet.[477] The municipalities contributed a total of $92,000, and estimate that they will reduce 1064 pounds per year of sediment loading.[478]

The Menomonee River group MS4 individual watershed permit expires on December 1, 2017.[479] If the permittees agree to continue coverage under the individual permit, the next iteration of the permit could incorporate language discussing the use of Milwaukee MSD's green infrastructure plan for WQBEL compliance.

CONCLUSION

Despite somewhat piecemeal and evolving federal requirements and guidance, Wisconsin has innovated and integrated water policies and programs to create a fertile environment for watershed planning and implementation. Through its significant efforts, Wisconsin has catalyzed the development and implementation of watershed plans and built up critical practical experience. Despite Wisconsin's significant effort and progress, however, it stands with other

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[470] Meeting Minutes, Meeting of the Menomonee River Watershed-Based Permit Partners (May 21, 2014) (on file with author).

[471] Email from Bryan Hartsook, Water Res. Eng'r, Wis. Dep't of Nat. Res., to author (Jun. 7, 2016, 09:31 CST) (on file with author).

[472] *Id.*

[473] *Id.*

[474] *Id.*

[475] *Id.*

[476] *Id.*

[477] *Id.*

[478] *Id.*

[479] MENOMONEE RIVER WATERSHED PERMIT, *supra* note 454, at 1.

jurisdictions across the country at a critical juncture. With the persistence of nutrient pollution and greater public awareness, citizens and environmental groups are supporting, and in some cases demanding, stronger state action.[480] Lawsuits for increased regulation of MS4s, POTWs, and agriculture have been filed.[481] Environmental organization and citizen actions are not likely to abate until the public is satisfied that the policy solutions states are pursuing will restore nutrient impaired waterbodies. Wisconsin and other jurisdictions can choose whether to improve policies in order to scale up watershed planning and implementation and more effectively address water quality impairments or rest on current policies and fight expensive and protracted legal battles. Should states lose these legal battles, they could be required to pursue costly and ineffective regulatory or other approaches. To maintain its leadership and command of its water programming, this article recommends that Wisconsin work to strengthen its TMDL, MS4 and agricultural runoff policies so that they promote necessary additional watershed plan development and implementation statewide. By carrying out the suggested policy reforms, the state could more effectively promote restoration of nutrient impaired waterbodies and avoid the litigation battles unfolding in other jurisdictions.

[480] *See* Donnelle Eller, *Iowans Support Water Lawsuit, but Split on Who Should Pay*, DES MOINES REG. (Feb. 27, 2016), http://www.desmoinesregister.com/story/money/agriculture/2016/02/27/iowa-poll-iowans-support-water-lawsuit-but-split-who-should-pay/80938460/ [https://perma.cc/BC5W-YWGS].

[481] *See* Envtl. Def. Ctr. v. Envtl. Prot. Agency, 344 F.3d 832, 842 (9th Cir. 2003) (MS4s); Nat. Res. Def. Council v. Metro. Water Reclamation Dist. of Greater Chicago, 175 F. Supp. 3d 1041, 1045 (N.D. Ill. 2016) (POTWs); Bd. of Water Works Trs. of the City of Des Moines v. SAC Cty. Bd. of Supervisors, 2016 WL 7043012, at *3 (N.D. Ill. 2016) (agriculture).